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EDITORIAL.

THE GREATER care now exercised in utilizing the output of anthracite coal is shown in the saving and marketing of the small sizes, which were formerly thrown away. In some collieries the proportion of these small sizes, which are used chiefly in making steam, runs up to 40 per cent of the total shipments. It is evident also in the working over of the old culm banks, from which a considerable quantity of merchantable small coal is obtained. The shipments from the washeries, in fact, have been over two million tons in the past two years. Some account of the methods used will be found on another page. It is not impossible that, in a few years more, even the dust, or culm, will be saved and utilized in making power-gas, or in generating electricity at, or near, the mines, for transmission to points where it is needed.

EVERY HOUSE has its ghost. One of the vexatious wraiths of cyanidation is the white incrustation of the zinc precipitation box. That it exists, is well known; but what it is, seems to be a matter of some uncertainty. It is known that it sometimes coats the zinc, thus seriously diminishing its efficiency in precipitating gold—not to mention the incidental wasting of cyanide. It is, therefore, with no little interest that we note a paper, an abstract of which appears on another page, which has thrown light on this white precipitate. We hope that study thereon will not cease till it is ascertained, not only what it is, but also how one may certainly avoid its formation—a matter both of annoyance and of expense.

THE RETIREMENT of Carroll D. Wright, from the position he has held so long at the head of the Department of Labor, removes from official life a man who has made himself notable by his faithful public service, and by hard and discriminating work. No one knows better the statistics and conditions of labor, and very few could be named who have as keen and clear an understanding of the causes and progress of labor movements; and he has never hesitated in speaking the truth as he saw it. The service which brought him most conspicuously before the public was that he rendered as a member of the Anthracite Strike Commission,

and as arbitrator in the minor disputes which have arisen under the Commission awards; but that is only a small part of the work he has done. In his present position as head of a technical school, Col. Wright will doubtless do good work—we hope for many years to come; but it will be hard to fill the place he has left in Washington.

IT IS INTERESTING to note that Mr. J. H. Curle is of the opinion, as expressed in *The Economist*, that the row of shafts, on the Rand, now being sunk, or to be sunk, to a depth of 4,000 feet, are as deep as will be required; the ground covering the dip of the banket to a greater vertical depth is not likely to be profitable because it cannot be financed into separate companies. The 4,000-ft. shafts will work the deeper ground by inclines, and the owners of them are in a position to compel the holders of the outlying claims to sell on reasonable terms. The sinking of a shaft to 6,000 feet and the erection of a mill of suitable size involve an expenditure not warranted by the diminishing yield of the lodes, which now contribute more than one-quarter of the world's gold production.

OUR ESTEEMED contemporary, the *British Columbia Mining Record*, is usually not wanting in courtesy, but in a recent criticism of an article on Mt. Sicker written by Mr. Robert Musgrave, and appearing in this JOURNAL, it starts with a needless dwelling upon an obvious misprint and then falls into a confusion between the author's statement that individual orebodies are likely to lack continuity and the theory of other "greater authorities" who have erred in prognosticating the general non-persistence of ore in that region. To this succeeds a rather pompous commentary upon the unpretentious views of a young mining engineer, as given in an article which in many ways was a model of intelligent description and careful statement.

THAT THE discussion concerning sinking vertical shafts to 6,000 feet and 8,000 feet on the Rand was not warranted by the facts known concerning the persistence of the ore, appears now to be admitted. Even Methuselah must die. The experience of such mines as the Wolhunter, Jumpers, Heriot and Glencairn has brought home the fact that the banket is not uniformly, nor is it persistently, rich; in other words, one-half the general argument for the value of deep levels has collapsed. In all matters of this kind truth is best, even in the most commercial sense; the more good money is wasted over unpromising enterprises, the less is there available for the sound undertakings.

THE HEAVY SHIPMENTS in the later months of the season have brought the movement of iron ore from the Lake Superior region up to a point which was hardly considered probable, or possible, in August. The movement has been helped also by a comparatively late closing of navigation. So great was the rush at the close, that the November shipments were three times as great as those of that month in 1903. While the full port figures are not yet available, the total shipments by Lake for the season are reported at 21,226,591 tons; a quantity which is only 2,422,959 tons less than in 1903; and greater than in any year prior to 1902. The great facilities for shipping are shown by the fact that 19,455,000 tons of this year's ore were moved after July 1—that is, in five months.

ON ANOTHER page we publish Mr. Frederick L. Hoffman's careful study of coal mine accidents in the United States in 1903. The publication of this yearly article has been unavoidably postponed, owing to the difficulty in obtaining accurate statistics from two or three States. The author has, for a number of years past, made a careful study of the comparative risks to life in different occupations, among which mining holds an important place. His figures and comparisons can be relied upon, and they constitute an interesting study on a subject which ought to receive more attention than it does.

MR. HENNEN JENNINGS has received the gold medal of the Institution of Mining and Metallurgy in recognition of his services to the mining industry and mining education. The award is well merited and will add luster to this mark of distinction, which is conferred annually by the council of the institution. It is interesting to note that Mr. Jennings has been re-elected a member of the Board of Studies of the University of London, and at the same time another distinguished engineer, Mr. Walter McDermott, has been elected to the board, the usefulness of which cannot be doubted.

IN THE CURRENT *Bulletin* of the Institution of Mining and Metallurgy, it is affirmed that "there is *no foundation whatever*" for our recent statement concerning the outcome of the deliberations of the committee appointed by the English government. The italics of the bulletin are out of place, because the information at our disposal when we made the comment, appearing on September 22, was of an unquestionably reliable character. It is always practicable to deny intentions, and it is difficult to prove them. *Qui vivra, verra.*

AS WE GO TO press we learn that Sir Lowthian Bell is dead. This is sad news to many on this side. As president of the Iron and Steel Institute he visited the United States in 1890, while at an earlier date he served as juror at the Philadelphia exhibition. He was formerly mayor of Newcastle and a director of the North Eastern Railway. But these distinctions were of small moment compared to the leading part he took in the technical development of the iron and steel industry. Venerable in years, honored by his country and his profession, Sir Lowthian ends a career of great usefulness. For years past his written or spoken words have been authoritative in the British iron world, and his criticisms on American metallurgy have been of great benefit to our ironmasters. He was born in the year following that of Waterloo, and as a leader of progress in iron metallurgy he lived to see the conquest by mankind of an industrial kingdom.

SLIME: A DEFINITION.

The significance of this term is again the subject of disputation. This is well; until there is agreement concerning the specific meaning of the terms we use, the discussion of technical matters continues at cross-purposes. In ordinary usage, slime is an adhesive impalpable mud. In metallurgy, the first idea is of mineral matter which has been ground to an extremely minute state. Also, deformation is involved; the particles are supposed to be fragmental, their original, and possibly crystalline, outlines having been destroyed in course of pulverization. Moreover, dry impalpable powder is not mud; therefore the admixture of water is assumed. Slime is a metallurgical mud. But that is not enough; for the word, as employed in milling, is a synonym for the refractory, and not by reason of fineness alone. Why? Because of the difficulty of making it settle, in the process of concentration, or of leaching it, in the process of lixiviation; it is to a certain extent unsettleable and unleachable. These two difficulties, inherent in slime, are due to three distinct factors and their interplay; the particles are minute, they are unclassified, and they are non-percolable. There is no essential chemical or mineralogical difference between 'sand' and 'slime'; it is possible to have a pure quartz slime. Levity or relative specific gravity plays its part, but it is not a determining factor in making slime. Pulp finer than 200-mesh was recently defined as slime; but, while fineness influences leachability and percolability, it is not the controlling cause; the shape and size, and the *difference* of shape and size, are no less important. A homogeneous uniform powder, the particles of which are granular, such as sifted quartz, is fit for leaching and presents no obstacle to a chemical process; such material also, when carried in water, will settle and by permitting decantation will allow of separation in a mechanical process; it is docile, not refractory; in other words, it is *not* slime. Material which is unclassified, consisting of particles of varying dimensions and weight, will resist leaching and filtering—the practicability of both being dependent on percolation—because the finer stuff packs the interstices of the larger, making an impermeable mass; such is the fine product from the stamping of an ordinary ore. This refers to size of particles; but shape is another factor, for even coarse material of uni-

form size may yet be a slime, as is illustrated by a talc mud the particles of which settle in water slowly and incompletely because of their flat shape, which causes a tendency to overlap, as shingles do, preventing the passage of rain. Such material is slow to overcome the cohesion of water, and when it has finally subsided, it resists the percolation of chemical solutions. The filter-press, by the aid of severe squeezing, allows such solutions to be forced through this compacted pulp, so that it is not unleachable under particular conditions. Similarly even the slime, which obstinately refuses to settle from suspension in water, can, by the introduction of lime, be so coagulated as to be readily precipitated. Thus we finally arrive at the definition of slime, from the metallurgical standpoint; it is an unclassified impalpable mud which it is difficult to decant or to leach.

THE LOGIC OF VALUATION.

In a recent discussion of this subject we took the Greene Consolidated Copper Company as a text, and our treatment of the matter was not approved by everybody. The reference to a particular mine caused annoyance because of an unexpected collapse in quotations which happened to occur shortly after; but this, of course, was no consequence—merely a coincidence, in which we take no pleasure. It was necessary to take an individual mine as a text or example, upon which to hang the argument, for generalities are without point when discussing so practical a matter as this. Next, we have been criticised for an error of fact; the dividend was stated as $4.80 per annum, while it is half that amount. The error arose from the unusual practice of a bi-monthly distribution of profits; dividends are generally paid either monthly, quarterly, half-yearly or annually. However, we do not regret the mistake because it does not impair the argument, our view being that the magnitude of the dividend affords no basis for estimating the value of a mine share unless it signifies a continued payment of dividends at the same rate, and for this there is no assurance save in accurate statements of ore reserves. Moreover, the error will serve as unintentional evidence of our lack of speculative interest in Greene shares and emphasize the motive of our reference to the matter—a disinterested discussion of one aspect of mining which is frequently overlooked.

One inference—unwarranted though it be—we do regret. The lack of reference to the recent improvement in the conduct of operations at Cananea is taken as a disregard of good work and a reflection upon the successful efforts which have reduced costs and systematized everything at the mine in a manner which affords strong contrast to conditions existing a year, or more, ago. Space did not permit of dwelling upon this point in our editorial two weeks ago, nor was it deemed fitting to divert attention from the subject in hand—mine valuation—by considering another which did not bear upon it. The good work done of late in reorganizing affairs at Cananea, in solving problems of ore treatment and exploitation, and in changing an amorphous undertaking into a crystalline business, are cordially appreciated not by us alone but by professional engineers generally. But this is another story, and we did not dwell upon it in connection with the discussion of a distinct problem. As we said of the rate of dividend, so we say of the mining cost, one may be generous and the other may prove economic management, but unless the ore reserves are available to yield the first and to permit of the exercise of the second, there is no financial security. It may be that we mistook a great and growing speculative venture for an investment, but to this we can only say that every big mine partakes of both; it is a speculative investment, as is recognized by the high rate of dividend demanded.

MR. LAWSON, OF BOSTON.

Boston won fame from Mr. John L. Sullivan; it now is linked to the notoriety of Mr. Thomas W. Lawson. In both cases the conjunction savors of *la malice des choses.* With more literary and philosophical associations than any other city on this continent, it bears the reproach of a filibuster whose performances appear to create as much consternation in the stock markets as an unmanageable automobile in a crowded thoroughfare. The activities of this over-wrought promoter have variously created amusement and disgust, followed at last by a great deal of irritation among those who have suffered from his depredations on share values. There are a few who hold that his self-imposed task of enlightening the farmers of New England and Missouri concerning the dark ways of high finance is producing results, the importance of which is apt to be obscured by the smoke of his pyrotechnics. To the well-informed, Mr. Lawson's story of dealings with men as unscrupulous as himself is not convincing; it only illustrates anew the difficulty of finding an honest partner for a swindle; nevertheless, he has explained to simple folk all over the country how "the game is worked," and by his elucidation he has undermined the confidence of a multitude of small investors, whose savings are represented by bonds, stocks and insurance. There is no doubt about his having reached a wide public, nor is there any question concerning the uneasiness he has created. Much that he says is false, much is mis-stated, but there is enough of truth to perturb the thoughtful. Mr. Lawson has such a sacred regard for truth that sometimes he uses it; he knows at least the promoter's motto, "when in doubt, tell the truth." He is rarely in doubt. Nevertheless, despite obvious absurdities and transparent trickeries, there is enough in this phenomenon—when in science we do not exactly know what a thing is, we call it a phenomenon—of frothy wordiness to make any good citizen uneasy. The Boston pamphleteer has found a new use—or misuse—for the press, and he has demonstrated the wide sweep of power possessed by a clever pen. If the better informed public, and those who do not watch the tape, observe his vagaries with amused contempt, it is because they know that he is doing in a flamboyant impertinent way what is done with much dignity over large mahogany tables in the offices of big financiers. It is a disquieting fact that leading capitalists and bankers in New York are also reckless speculators; that money rates, dividend declarations and announcements of policy are used as counters in the game of speculation carried on by financial magnates. It is the unspoken appreciation of these facts which renders Mr. Lawson's phillipics so little startling to a citizen of New York, while at the same time they fill the small investor in the country with a fear for the security of his savings. The Lawson episode is the cholic smile of a deep unrest, due to the collapse of a series of big flotations and the monetary debauch of a great industrial prosperity.

Whatever foolish things Mr. Lawson may say and do, he has, it seems to us, demonstrated three things, that mining companies which do not give proper information to their shareholders are vulnerable, that the New York stock market can be stampeded like a herd of buffalo, and that you can fool a good many of the people long enough to make money.

MARKET CONDITIONS.

December 21.

The metal markets are still quiet, the approaching close of the year and the holiday season exercising the usual influence. Copper is quiet and a little easier. Lead is rather monotonous, but spelter is strong. In the Joplin ore market prices are also high. The chief incident during the week has been the breaking of the corner in spot tin in London, with a corresponding recession in prices for immediate deliveries.

Silver is steady and somewhat stronger, with a firm undertone to the market.

The iron and steel trades continue active, as buying has been heavy, in the expectation of increasing prices. The pools at their meetings this week have generally advanced quotations materially, as shown in our special reports.

The United States Steel Corporation has started up a number of its idle furnaces, and is evidently making preparations for an active business in the first part of the coming year. Moreover, the Corporation has had, evidently, a hand in advancing prices.

The western coal trade is somewhat irregular, chiefly owing to the difficulties in transportation. The seaboard bituminous trade has been less affected by this condition, and continues very good. In the anthracite trade there are no material changes to report; weather conditions continue favorable to the trade.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

The great topics of chemical industry are sulphuric acid and the alkalies; the latter term includes sodium hydroxide, sodium bi-carbonate or cooking soda, and sodium carbonate or washing soda.

A novel clock is postulated which may run for centuries. The motive power is a bit of radium salt which operates on a vibrating piece of gold leaf, with alternating charge and discharge of electrical energy. This is not necessarily any exception to the thermodynamic law which permits of no perpetual motion.

After an incandescent light bulb has been in use some time the glass becomes slightly darkened. This is due to the infinitesimal portions of the carbon filament given off as vapor, which settle on the interior of the bulb. There is also an actual burning of the filament caused by the small amount of oxygen in the bulb, it being impossible to produce a perfect vacuum.

Wiring for an incandescent light system for factories or offices is done on either the multiple-arc or three-wire system; the latter is preferred for large plants, as it takes less wire.

In order that an arc lamp may produce light it is necessary that the carbons should first touch, to make connection for the current, and then be slightly separated to cause the arc. This motion is accomplished automatically in the Brush lamp by the action of a solenoid, whose cones rise when the current is turned on, thus separating the carbons.

A green beryl weighing 224 oz.—more than twice the size of the great gem in the Imperial Mining Institute at St. Petersburg, Russia—was discovered in Minas Geraes, Brazil, last year.

Meteoric iron contains several alloys of the metal with nickel. These alloys are grouped in exquisitely interlacing crystals, the meshed structure of which comes out, on etching, as the so-called Widmanstätten figures. There is the groundmass, plessite, carrying the plates, kamacite, and the bands, taenite. There is also a brilliant white iron, lamprite, which resists the action of acids.

Most meteoric iron contains nickel, but the corroboration test is the production of the Widmanstätten figures by etching.

The list of reducers, in practical metallurgy on the large scale, is not a long one; carbon is the main stay. In the laboratory, hydrogen is often used. Sometimes, as in the old Castner process for aluminum, sodium is the reducer. It is one of the marvels of modern metallurgy that many of the metals included in the rare-earth group may be readily reduced by aluminum, and possibly on a commercial scale—hence the new term alumino-thermy as in the production of ferro-vanadium, ferro-tungsten, ferro-manganese, etc. But of all reducers—for reduction is only a question of energy—the electric furnace and the electrolytic cell offer the greatest possibilities.

ETHICS AND INDUSTRY.

Mr. J. Swinburne, the past president of the Institution of Electrical Engineers, London, recently delivered to the students of the school an address entitled, 'Some Difficulties in Getting On.' We quote some timely sentences which—whatever else they may be—are refreshingly outspoken:

"No science teacher is so foolish as to tell his pupils in so many words that the object of science is not to be useful; but the whole attitude of science in this country is that of contempt for practice, and admiration for unapplied science."

"Science for which no use has been found, or which is not applied, is called 'pure science'; whereas it is usually the raw material and should be called 'raw' or 'crude' science."

"There is supposed to be something noble and superior about 'raw' science; and its study is treated as the unselfish devotion to the interests of man, which is obviously entirely the wrong way round."

"Round the industries generally: Who are at the top? Always the business men. The man at the head of large industries generally knows very little science." . . "If he wants good technologists he employs them."

"The business man at the top; the practical engineer in the middle, and the unpractical engineer, or the raw scientist, at the bottom."

"I remember once a board of directors finding fault with a report of mine because I said that making a certain article would pay. They said that such a statement was outside my province altogether, as I was a scientific man, and therefore could not possibly know whether a manufacture would pay, as that is a business question."

"There is a wide distinction between the man who can earn a few hundreds a year and the man who earns as many thousands. It is a very curious thing that there is hardly anything between. . . The engineer who is worth £750 ($3,750) a year seems hardly to exist, except for a short time on his way from one class to another."

"When I say that a man's earnings are a rough test of his value to the world, a great exception must be made in the case of genius. . . It would be ludicrous nonsense to say that the value of Newton or Faraday could be reckoned in terms of their pecuniary earnings."

"In the charter of the Institution of Civil Engineers the engineer is defined as 'Directing the great sources of power in Nature for the use and convenience of Man.' With all respect I would humbly suggest that it is bad. . . An American definition is much better: 'An engineer is a man who can do for one dollar what any fool can do for two'."

"A business man may have no knowledge of the ways of nature, but he has a knowledge of the ways of man, a knowledge which is infinitely more difficult to acquire, and infinitely more difficult to employ well."

"There is lots of human nature in Shakespeare; but we do not read it now."

"Unfortunately, you will find that even good college educations are not of high market value. That is largely because technical colleges are subsidized, so that education costs the student little money. This tends to reduce its market value, however good it is in itself. You will find all about this in books on political economy. Mill deals with it, I am sure."

"It is cant to profess contempt for money. The poet professes to work for fame, and so does the musician, the artist, the philosopher, the scholar, and the man of letters."

These excerpts give a fair impression of the opinions of this successful man of pure or 'raw' science, of applied science, and of business. Moreover, Mr. Swinburne is remarkably candid—almost ingenuously so; but because of this refreshing candor he is liable to discourage many young men who are in the thick of the business fight, or who are preparing to throw themselves into it. Some observations are in place.

It is a money-seeking age that we live in. Money is desirable because, in a word, it represents energy; and energy is the one great object of strife in the grand battle for survival. The struggle of industry falls into its place as only a part of the big nature contest. It is a great fact—but it is not all of life. We once heard an athlete remark that, to play football well, one must be able to think of three things at once; and he could think of only two. The observation sums up the problem. Mr. Swinburne is thinking of two things—and only two. A knowledge of things and a knowledge of men—both are needed. Mr. Swinburne näively confesses that—beyond all that he states so truthfully and so forcibly—there is another side; there must be, else the struggle of civilization would be written only with the pen of a pessimist. To all that Mr. Swinburne says as to the necessity for business wit and energy we agree, but let him—let all busy advisers—take one moment more to recognize the essential need of culture, what we call the humanities. He is his own critic in recognizing the worth of genius—even of a Newton or a Faraday. He is his own critic in his melancholy confession that he no longer reads his Shakespeare—perhaps not even on Sundays. Mr. Swinburne has done a service in emphasizing the value of the faculty of applying technical training; but the candor of his speech fortunately suggests the omissions. He speaks with the confused nervousness of one looking out from the sweat and dust of the conflict, rather than with the self-control of one who stops to ask what he is getting out of the game. Is it not better for all to remember the third element of life? With a knowledge of physical fact, and of human selfishness, let us hold fast to the essentials. These must all be remembered and used—at once. We disclaim all responsibility for the conditions of the Nature struggle; Nature made them. It is our function merely to remind ourselves that the conditions controlling development are not narrow, and that they are steadily gaining in height and breadth.

CHEMICAL INDUSTRIES OF CANADA.—Professor W. R. Lang recently delivered a lecture in Toronto on the chemical industries of Canada, dealing largely with the extracting and refining of mineral products and metals. He referred to the revival of silver-lead mining in British Columbia, owing to the government bounty, and also spoke of the opening up of mines in the neighborhood of Lake Temagami; he also referred to the field offered by the Haileybury region and the Temiskaming country. Mr. Lang also spoke of the graduates who were employed by manufacturers in investigating processes and materials used in the industry.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of THE ENGINEERING AND MINING JOURNAL.

GOLD MINING IN SIBERIA.

The Editor:

Sir—I have read with interest the article by Mr. J. H. Curle, entitled 'Gold Mining in Siberia,' in your issue of September 15.

Mr. Curle discusses the gold mining districts of Siberia as affording an opportunity for the investment of foreign capital, and expresses an unfavorable opinion. He condemns the country on account of the general conditions which, in his opinion, prevail. If such an opinion were correct, it would form a serious criticism, not only on the gold mines, but also on all mining enterprises in Siberia. I believe that this opinion is not correct, and I base my views upon a working experience of Siberian mines since February, 1903. Since that date I have been engaged with a staff of English and American assistants, for the first six months in prospecting work, for the following eight months in prospecting and developing an extensive group of small mines, and for the last six months in the actual operation of one of the old well-known copper mines, which has been operating for forty years, and where we are now daily employing 1,500 men.

I state these facts not for the sake of drawing attention to this mine, which can take care of itself; but in order to show that the opinions which I shall express are founded upon genuine experience.

Mr. Curle groups his objections in three classes: (1) racial, (2) political, (3) economic; and I will discuss these in the same order. (1) The Russian language is not the obstacle Mr. Curle imagines. An intelligent man will in six months acquire a passable knowledge of the language, and in a year will be entirely independent. Our party consists of four men—two mining engineers, one chemist and one accountant. We have been without an interpreter for a year, and I venture to say that we control this considerable establishment with ease, although we found it in a sad state of disorganization when we arrived. My experience of the subordinate Russian officers is that they are genial, sympathetic men, very much in earnest about their work, fully aware that their methods are not up to date, and anxious to improve under direction. Considering that they work for salaries and are content with conditions which an Englishman would consider insufficient, I would not wish to substitute Englishmen for them. In some respects, for instance in chemistry and surveying, I consider their work is admirable; and, to find similar qualifications in an Englishman, it would be necessary to seek an entirely different and more highly paid individual. As regards the artisans and the laborers and their methods, I think that it requires an actual experience of them to understand them. I formed at first, with Mr. Curle, an unfavorable opinion, but I am being compelled to modify it. It is nothing short of marvelous to see what work the carpenters, smiths and boiler-makers can do, especially with the tools at their command. If Mr. Curle could have the opportunity of working with these men, and see the quantity and the quality of the work which they turn out, at the very low wages which they receive, I fancy that his pride in labor-saving devices would undergo a shock. It does not surprise me that Mr. Curle should condemn their methods; I did so myself during the first six months I was in the country; but I have seen enough now to make me thankful that I did not condemn the country on this account. As to holidays, each mine has its own regulations, adapted to its requirements. At this establishment most of the men work a day of 12 hours, Sundays included, and there are only three all-round holidays in the year. Even during these, sufficient men are willing to work to enable us to keep the furnaces running. I do not think there is any more intoxication at our mines and works than in the average mining camp of America or Canada.

(2) Mr. Curle states that "the political conditions are not so serious." I consider them, on the contrary, by far the most serious difficulty with which a foreigner has to contend. With patience and tact, however, they can be overcome. The Government requires certain detailed reports and a considerable amount of red tape, but this can be settled by the employment of a clerk at $250 a year for the preparation of the necessary reports. Such conditions are not peculiar to Russia, but prevail in many foreign countries; most of the regulations are conceived in an admirable spirit; but, in formulating them, the Russians have allowed their inordinate love of detail to pass the limits of discretion. Mr. Curle has not mentioned the subject of taxes, which plays such an important part in the success of mines in many foreign countries. Mines in this country are not strangled by taxes. Ours amount to about $250 per annum.

(3) The economic conditions which Mr. Curle describes may be true in certain parts of the country, but they are not true for all; certainly not for this region; and, as I believe, not true for any portion of western Siberia. As to climate, we traveled on wheels last year until January 1, and were again on wheels on April 1. To-day, toward the end of October, I am sitting with the windows wide open, and the weather is superb. The climate here closely resembles that of western Montana, or the Northwest Territories. We work without interruption all the year round, although we have to haul our ore 70 miles and our coal 25 miles by road. We are situated 800 versts (533 miles) from the railroad, but the system of haulage is so perfect and so cheaply carried out, that we receive our freight and ship our products with perfect regularity at the extraordinary low rate of £3 4s. per long ton. The cost of sending bar copper from here to Moscow (533 miles by road, and 1,700 miles by rail) is £4 16s. per ton. Can this be duplicated elsewhere?

The country is so richly endowed both in agriculture and minerals that we import nothing except ironware, tea, sugar and oil. The staples of life, such as wheat, oats, flour and meat, are produced in abundance locally and are sold at incredibly low prices; meat, for instance, is retailed in our store at 1½d. per pound. All the mineral products necessary for carrying on a large works are found locally, such as clay, limestone, iron ore, quartz, coal, timber, and so forth.

If I write more on this subject, I might appear to be attempting to "boom" this district. This is not the case; I am only pointing to the facts within my actual experience in order to show grounds why Mr. Curle's generalizations should be carefully scrutinized. Mr. Curle did not come near this district, although it contains many hundreds of thousands of square miles. Otherwise, he would have hesitated to make the statement that "Alluvial mining must continue for some time to be the backbone of Siberia." Surely such wholesale generalizations cannot be made of a country of the extent of Siberia, after a few months' travel. Mr. Curle does not state whether he knows the Russian language or not. It may be inferred from his article that he does not. If this is the case, can it be supposed that his opinion has any value excepting as to the particular mines which he visited, and as to which, as a mining engineer, he is undoubtedly capable of judging? He himself refers to the unfortunate condition of a man who is dependent upon interpreters. Can it be possible that Mr. Curle has allowed himself to fall into a position which he describes as "appalling"?

E. NELSON FELL.

Akmolinsk, Siberia, Oct. 23, 1904.

THE LOGIC OF VALUATION.

The Editor:

Sir—In your editorial of December 8, on the logic of valuation, you take as an example the Cananea mines of the Greene Consolidated Copper Company, and you assume that the valuation of this property is too high because an enormous reserve of copper ore does not exist capable of accurate measurement. You state that the question of measurable ore reserves is the only important factor—"the crux of the whole question." Those accustomed to mining in the irregular ore deposits of Arizona and northern Mexico will disagree with you.

In the copper mines of this region it would be bad mining and economically inadvisable to open up extremely large ore reserves in such a way as to permit of accurate measurement, yet it would be foolish to deny that they are of great future value; 24 per cent of the copper production of the United States comes from these deposits in Arizona, and the Cananea mines referred to are already producing 30,000 tons of copper annually, an amount equal to one-tenth the output of the United States, or to nearly one-half of all the copper mined in Arizona. There are other more important factors employed in the valuation of these mines, which in themselves are good and sufficient reasons to justify a very high valuation, and to discredit the future of Cananea because there are not great ore reserves opened up capable of accurate measurement is as futile as to discredit next year's corn crop because the seed is not yet planted. The value of the Cananea mines to an investor depends to a large degree on his faith in the future of the orebodies as indicated by their enormous dimensions; on the recent discovery of the new Massey deposit, which already promises to be one of the greatest orebodies ever opened up in Mexico; and on the persistency already demonstrated to exist in the analogous ore deposits of the adjoining district of Bisbee, to which they are closely allied.

If your criticism were to result in an attempt on the part of the management to open up considerable ore reserves beyond those already required to operate the works with regularity, it would increase the difficulties of mining appreciably and injure a great industry. On account of the cost of supporting the

ground, it would be cheaper to carry a stock of, say, several million tons of 5 per cent copper ore on the dump as a reserve, but the mere mention of this alternative demonstrates its foolishness, although your requirements can not be secured in any other way. Even if such a result were obtained, what would have become of the enormous quantities of 2 to 3 per cent copper ore still remaining in the mine, which can now be handled to advantage, although it could not have been profitably extracted one year ago? Is it not logical to appraise the future of Cananea by the past of Bisbee and the present of both, or are irregular copper ore deposits in heavy ground not worth very much anyhow? Very many careful and shrewd investors do not believe that the Cananea mines are over-valued, and it may be that the simple rules employed in the valuation of tabular gold ore deposits in hard ground are not applicable to another set of conditions. JAMES W. MALCOLMSON.

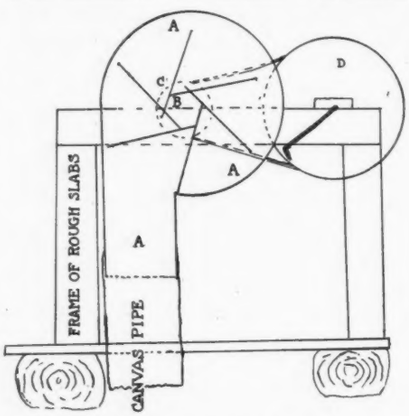
El Paso, Tex., December 14, 1904.

[The subject of this letter is referred to in our editorial columns. No, it is *not* logical to appraise the future of Cananea by the past of Bisbee, any more than it is proper to assume ore reserves in a mine at Bingham by reason of a great record at Tintic, or *vice versa*. "The value of the Cananea mines to an investor" does not depend upon faith, but upon facts; speculation is based on faith; investment is founded on fact. No matter how irregular the orebodies or how rapid the development, it is possible to state approximately the resources of the mine in tons of ore available for extraction, for should not such an estimate be the basis for the equipment, the rate of production and the dividend? Ore reserves are measurable with varying accuracy in mines of different character, but because absolute blocking out is impracticable in a fast growing mine, is the manager to be excused from systematizing his data and submitting his conclusions to the shareholders? Decidedly not. Of course, no estimates of ore in the ground are as accurate as those of ore in the bin; nevertheless, the shareholders are entitled to have whatever estimates are available; they are entitled to have such information of this kind as is given to the directors. Does Mr. Malcolmson suppose that the controllers of the Greene Consolidated have not been given some approximate data on this point by the mine manager, consulting engineer or whoever is responsible? Shrewd speculators may have their belief that this mine is not over-valued, but careful investors will ask for information. We have no opinion whatever on the matter, and only quoted this mine in order to give point to a general discussion. Measurable ore reserves are the foundation of a mining investment; beliefs and guesses are the vanes of speculation. *Chacun à son goût et le marchand vend tout.*—EDITOR.]

A QUESTION OF VENTILATION.

The Editor:

Sir—I have just been taking advantage of a little spare time to look at some back numbers of your JOURNAL, and have been much interested in the article on ventilation, November 3, 1904. I can fully endorse your opinion as to the superiority of direct blowing as a method of removing the products of combustion, over that of suction; I have known cases in which the little pure air present in the working was removed by the suction in a greater degree than the foul gases which it was intended to take out; of course, these things occur only in cases where the ventilation is of a temporary or makeshift character, as in prospecting, or initial development work, and there one sometimes runs up against unexpected trouble. The following instance, and the means taken to overcome it, may be of sufficient interest for publication. In sinking a prospect shaft on a copper vein in Algoma some time ago, we were, after getting down about 50 ft., much delayed by the gas from the dynamite, which, in the dull weather then prevailing, would sometimes remain at the bottom over night, and until the middle of the forenoon. We had several narrow escapes from being overcome by the effects of this gas; a blower of some kind was absolutely necessary, but we had no steam power, no piping, little lumber fit for anything. All that was available was about a dozen lengths of old stove-pipe, a couple of pieces of bar iron, some old canvas and the usual prospector's blacksmith kit. With these accessories I constructed a centrifugal



SKETCH OF VENTILATOR.

blower and pipe in the following way: By slitting some of the stove-pipes and flattening the iron I provided some sheets fit for use; then with some of the old lumber I had two sides made for the blower, as in the sketch at *A A*; these were placed about 16 in. apart, and the sheet iron fastened from one to the other, so as to form the air-chamber of the blower. In this was first placed the fan, formed from a piece of dry cedar, *B*, whittled to a roughly hexagonal shape, hooped at each end with some strap iron from a box, and carrying at each end six wooden arms, to which were fastened pieces of the stove-pipe iron to form the blades. Into the ends of the hub *B* small gudgeons were driven, one of which carried a 6-in. pulley (shown in dotted lines *C*) made of two pieces of 1-in. board, with a deep groove to receive the belt. The larger pulley *D* was similarly constructed, the crank or handle being taken from a spare windlass; the bearings were whittled out of some pieces of dry hard-wood, the belt made of some pieces of old belting obtained at a neighboring farm. Lastly, the wind-pipe was made, 10 in. diam., out of old canvas cut in strips and stitched together with cotton twine. The pipe did not quite reach the bottom of the shaft, but the force of the blast was sufficient to carry the air to the point where it was needed. We found it necessary not only to blow for a short time before going down after firing, which we sometimes did at noon, but also to keep the blast going while mucking out, owing to the quantity of gas discharged in handling the fine muck. I was, on one occasion, suffocated on going down to examine the work after two-thirds of the rock had been taken out; the blower had been stopped, but on my turning over some of the fine stuff remaining in one corner, I was at once overcome by the gas, and had to be hoisted out in the bucket. One cannot be too careful in these matters. I forgot to say that our little blower ran as easily as an ordinary grindstone; I often ran it myself for over half an hour steadily while the men mucked out.

S. DILLON-MILLS.

Toronto, Ont., Dec. 8, 1904.

RAIN AND SNOW ON MOUNTAIN SLOPES.

The Editor:

Sir—The climatic conditions in Mexico vary so rapidly according to altitude that an explanation of the rainfall in certain localities is of interest, showing as it does the effect of topography on the precipitation.

There is a strip of country on each side of the central plateau which is called the "Hot Country." This is of variable width, but generally 70 to 100 miles, and rising from sea-level to about 2,500 ft. A rapid rise begins at this line which continues up to six or seven thousand feet in altitude, after which the top of the plateau is comparatively level, except where intersected by mountain ridges. The rainfall on the slope from the plateau down to this *Tierra Caliente* is especially heavy from June to November, after which the dry season follows. In the winter, or dry season, fogs are of daily occurrence, and at La Aurora, near Teziutlan, at an altitude of 4,500 ft., I have had the experience of not being able to see the sun for a week at a time. An hour's ride on horseback, either up to the plateau or down to the "Hot Country," would bring one to a place of sunshine without a cloud in the sky. Along the steep slope of the plateau would be a line of cloud formation which was dissipated by the heat of the sun as soon as it rose over the inclination.

These conditions call for an explanation, and the popular one is that the warm moist air coming in from the Gulf of Mexico is condensed by striking the cold mountain, which produces fog in winter and rain in summer. The error is that the mountains are not cold. During the period of fog the ground is warmer than the air. The lowering of the temperature of the air is caused by the expansion as it rises over the steep inclination. The condensation caused by the sudden fall of the temperature produces the clouds of fog in winter and rain in summer. Heat is not received from the sun fast enough to overcome the fall of the temperature caused by expansion until the clouds reach the level top of the plateau, when they immediately disappear. The fog usually disappears after 10 P. M., and the sky is clear until the following morning, when the sun warms the air over the plateau, causing it to rise and draw air currents against the mountain slopes. The sun may shine bright and clear, and by noon the fog will creep up the slope and cover it like a blanket, bringing a chill with it that calls for as heavy clothing as is worn in northern climates. It is frequently possible to look over the top of the approaching fog and see the blue waters of the Gulf shining in the sunlight seventy miles away. Falls are numerous along the streams, and at Atexcaco there is a drop of 950 ft. vertical. There are several places where a pipe-line five miles long would have a fall of 2,000 ft. Some

of these water-powers are being developed and transmitted to Mexico City and other places.

The different effects produced in winter and summer, as indicated by fog and rain, are brought about by the smaller quantity of water in the air in winter and the lessened velocity of the winds against the mountain slopes, both of which are governed by the decreased heat received from the sun. This idea of expansion lowering the temperature and producing rain or snow is apparent in flat countries as well as in mountainous, as can be proved by rain or snow following close upon sudden falling of the barometric pressure. In all cases it means that a large body of warm air has risen and lowered the pressure by the tension necessary to draw air in to replace it. In cases where a mountain range runs parallel to the coast with a deep valley behind it, the side of the mountain range nearest the coast will receive a large rainfall, and the valley will be a dry desert in which all the vegetation is of the variety peculiar to such places. The prevailing air currents flow from the ocean areas toward the land areas in the day time, or when the sun makes the air over the land warmer than the air over the water, and they generally reverse at night when the air over the ocean areas is warmer than that over the land.

This brings up the question: Can rain be produced where desired? If an obstruction of sufficient size to cause the required expansion of the air in passing over it were to be placed in the path of the prevailing wind from ocean to land, it would produce the same result as the mountain range, and cause rainfall in its immediate neighborhood. The construction of such a rain fence is not to be considered a commercial possibility, even in a desert near to the sea, as it would have to be several miles in length and at least 1,000 ft. high to produce any marked result. The snowfall in summer on high mountains, like Orizaba, is another evidence of the lowering of temperature due to expansion of air in passing over an obstacle. It is quite evident that if the mountain were not there, there would be no snow in that place.

HIRAM W. HIXON.

Victoria Mines, Ont., Dec. 13, 1904.

RADIO-MERCURY.—Some varieties of cinnabar show an activity which does not seem to be identical with that of radium. It was strong enough to affect a photographic plate.

CANADIAN PEAT.—A practical test of the commercial value of peat from the deposits at Beaverton, Ontario, was recently given in Winnipeg. The peat briquettes burned well, and, after the consumption of the volatile matter, there remained a dense mass of blowing charcoal, which held the fire and continued to throw off heat for a considerable time. The process of manufacture used at Beaverton is simple. After the surface vegetation is stripped off, the peat is dug up by machinery and separated into minute fragments, which are scattered over the ground to dry. When most of the moisture has evaporated it is collected and compressed in an ordinary brick machine. There is very little difference in character between the Beaverton peat deposits and those in the neighborhood of Fort Frances, in the Rainy River district, and it is proposed to operate them both on the same lines. Manufactured peat from Fort Frances could be delivered at Winnipeg at a rate which would make it cheaper than coal at present prices.

THE WHITE PRECIPITATE.*

By A. PRISTER AND B. BAY.

The raw material of the 'white precipitate' studied by us came from the Ferreira Deep, and we assume that it represents the average composition of this troublesome compound. This was washed with Noebell's apparatus, as used for soil analyses, in order to separate the metallic zinc. The precipitate, collected in the fourth compartment of the apparatus, was filtered, washed and dried.

Determination of Total Cyanide.—The literature on this subject gives various methods. We followed Hirsch's method, which is based on treating the cyanide with dilute sulphuric acid in silver nitrate, and weighing the metallic silver obtained from the cyanide of silver.

We give herewith the results of one analysis: Weight of substance taken, 1.305 grams; silver obtained, 0.799 grams; corresponding to cyanogen, 0.193 grams; cyanogen in the original white precipitate, 14.7 per cent.

Second Determination of Total Cyanide.—Weight of white precipitate, as above, 1.645 grams; silver obtained from the AgCy, 0.974 grams; corresponding to cyanogen, 0.235 grams; cyanogen in the original white precipitate, 14.28 per cent.

Now that we had estimated the total cyanogen, the next question was to find a simple method for determining the ferro-cyanide. The main point is that when a caustic solution of a ferro-cyanide compound is treated with brominized caustic soda, the ferro- and ferri-cyanogen compounds are decomposed, the iron is precipitated, and from the iron found one calculates the ferro- or ferri-cyanide present. In our case we assume that we have only ferro-cyanogen compounds. As we are working in an alkaline solution, the zinc of the white precipitate would not interfere.

Analysis.—Fe_2O_3 collected for the total weight taken, 0.030 grams; corresponding to iron, 0.021 grams; in per cent of iron, 1.35 per cent.

Though our studies are yet not so far advanced as to establish definitely the real chemical constitution of the ferro-cyanogen compound, nevertheless, we think one would be safe in assuming that it is ferro-cyanide of zinc and potassium, $K_2Zn_3(FeCy_6)_2$. The iron found by this method would give $\frac{705.98 \times 1.35}{112}$ = 8.40 per cent of $K_2Zn_3Fe_2C_{12}$. We determined the iron, present as ferro-cyanide, by another method, and found 1.68, corresponding to 10.45 per cent of ferro-cyanide of zinc and potassium. The 10.45 per cent of ferro-cyanide of zinc and potassium would absorb 4.71 per cent of the 14.78 per cent of total cyanogen found above. We must admit that in the white precipitate there exists some other reducing compound. It is an iron compound, soluble in dilute sulphuric acid, because our total iron is 2.296 per cent, whereas only 1.68 per cent is taken by the ferro-cyanide of zinc and potassium.

The Bases Present in the White Precipitate.—These are shown in the following table:

	Per cent.
Ferro-cyanide of zinc and potassium, $K_2Zn_3(FeCy_6)_2$	10.45
Zinc cyanide, $ZnCy_2$	22.73
Hydrated zinc oxide, $Zn(OH)_2$	54.79
Copper oxide	0.40
Ferric oxide	1.00
Silica	1.03
Total	90.40

Qualitatively Found.—Calcium, sulphuric anhydride, aluminum, cobalt, magnesium, gold (assayed); traces.

Loss by Ignition.—At dark red heat the volatile bodies are:

	Per cent.
Cyanogen from the ferro-cyanide of zinc and potassium	4.71
Cyanogen from the zinc cyanide	10.07
Water from the hydrated zinc oxide	9.94
Moisture at 115° C	8.07
Theoretical loss by ignition	32.79
Actual loss found by experiment	31.32
Difference between theoretical and actual	1.47

This loss on ignition is evidently made up: (1), by the moisture (in our case, 8.07 per cent); (2), by loss of water when the zinc hydrate present in the white precipitate (in our case 9.94) is reduced to zinc oxide, following the equation $Zn(OH)_2 = ZnO + H_2O$; (3), hydrate present in the white precipitate (in our case 10.07); (4), by the decomposition of the ferro-cyanide of zinc and potassium, 4.71. Evidently organic matter may sometimes occur in this white precipitate and increase the loss by ignition. The total loss may be reduced by the re-oxidation of the zinc.

Another question that we propose to study in detail is the effect of the formation of this white precipitate, (1) on the alkalinity, and (2) on the percentage of free cyanide in the solutions passing through the boxes.

The large quantity of zinc cyanide present in this white precipitate explains, firstly, what part of the loss of free cyanide is indicated by the difference between 'head' and 'tail' of the same box; and, secondly, what is the excess of zinc salt partially eliminated from the solution.

The solution coming from the tailing tank is charged with ferro-cyanide of potassium, which precipitates on the zinc shavings as a part of the white precipitate. If the alkalinity of the percentage of free cyanide is high enough, as in the strong boxes, to keep this precipitate in solution, then it passes unobserved through the box; but if the solution be low in cyanide and alkali, as in the case of the medium and weak boxes, then it falls down and obstructs all the compartments. The same can be said of the cyanide of zinc. From an analysis published by Prof. Prister (in the *Journal* of this Society), the enormous difference between the ferro-cyanide present at the head and the tail of the box is emphasized. This also explains why the weak outgoing solution is sometimes free from ferro-cyanide.

For a plant of 100 stamps, half a ton of this precipitate means a loss of 0.02 lb. of KCy per ton of mineral treated. The method we employed for determining the total cyanide (distillation with zinc and sulphuric acid) is approximately the actual treatment of the clean-up.

We have shown that we obtained from the clean white precipitate over 14 per cent of cyanogen, or 14.6 cyanhydric acid, corresponding to over 35 per cent KCy; in half a ton of this precipitate we have 350 lb. of potassium cyanide. We leave open the question whether it is not more economic to pass the gases evolved from the treatment tank through working solution, and thus to absorb the cyanhydric acid evolved in the clean-up, instead of losing it all.

These studies of this most important deposit do not assume to be complete, but we present them in the hope that they will throw some light on this difficult subject.

* Abstracted from a paper in the *Journal* of the Chemical, Metallurgical and Mining Society of South Africa, September, 1904.

The chief ore of aluminum is bauxite. This is a hydrated aluminum oxide or a form of aluminic acid.

CALIFORNIA MINERS' ASSOCIATION.

BY OUR SPECIAL CORRESPONDENT.

The report of the first three days of the annual meeting in San Francisco was given in the last issue of the JOURNAL. On the fourth, or concluding, day of the session the resolutions were presented and passed, and the important action of the meeting taken.

While the convention of the California Miners' Association was not, in point of attendance, as large as some of those formerly held, it is conceded that, generally speaking, there was more interest in the proceedings. The papers read were written by men of standing in the mining industry, and the subjects chosen were of a practical and instructive nature. These papers will shortly be published in the *Proceedings* of the association, until which time they are not obtainable.

Probably the most important action of the convention was brought about through a paper of Professor S. B. Christy, of the mining department of the University of California, on the question of débris in rivers and the overflow of the streams. This was the adoption of certain resolutions memorializing the President of the United States to take steps which may ultimately lead to a resumption of hydraulic mining in California. The text of the memorial is as follows:

"To the President of the United States, Washington, D. C.:

"Whereas, The placer and hydraulic miner, who originally developed the resources of California and opened them to the world, obtained title from the government of the United States to his placer lands, with the common understanding that they were to be worked and their gold content recovered in accordance with methods of sluicing and hydraulic mining publicly known to have been devised and used for the purpose from the earliest stages of placer mining;

"Whereas, Many deposits of gold to the value of millions of dollars are now idly buried in the ancient river channels of California, under such conditions that they can be profitably worked neither by dredging, nor by drifting, nor by any other process than that of hydraulic mining;

"Whereas, The gold extracted by the hydraulic miner was generously poured into the treasury of the United States Government in the dark days of the Civil war, when the national currency was worth only fifty cents on the dollar, thus materially assisting in maintaining the credit of the government and in saving the union;

"Whereas, The hydraulic miner has been restrained by the United States courts from discharging boulders, gravel, sand, clay and other matter in suspension into the navigable waters of the State, whereby the industry of hydraulic mining has been destroyed and property to the value of over $100,000,000 has been rendered idle and unproductive since 1884, the natural wealth of the State rendered unavailable, and a deadlock has resulted between the fundamental industries of agriculture and mining;

"Whereas, While admitting the injurious effect if mining débris were not effectually restrained, the unavoidable effect of natural erosion and sedimentation has been ignored in the minds of the courts, as well as of the farmers, and all the injury due to natural causes has been charged to hydraulic mining;

"Whereas, Should hydraulic mining forever cease, to the injury of the miner, the natural process of erosion and sedimentation would still continue, to the injury of the farmer and the navigable waters of the State;

"Whereas, We are firmly convinced that, by a rational application of the laws governing the deposition of sediment from torrential streams, the industries of hydraulic mining and agriculture can both be carried on in this region, not only without prejudice to each other, but to their mutual advantage, and

"Whereas, This question is primarily a geological one and can be solved only by geologists, who have devoted their lives to the study of erosion and sedimentation, in mountain as well as in valley regions; therefore, be it

"*Resolved*, By the California Miners' Association that we beg you, as President of the United States, to assist in the solution of this problem affecting all the interests of a great commonwealth, by instructing the director of the United States Geological Survey, through the Secretary of the Interior, as part of his study of the storage of flood waters and the reclamation of waste lands, to undertake a particular study of those portions of the Sacramento and San Joaquin valleys affected by the detritus from torrential streams.

"The points we wish particularly considered are:

"First—The most favorable sites for reservoirs for water, whereby destructive floods may be averted and the waters stored and utilized for the benefit of agriculture, mining and other industries.

"Second—The selection of suitable tracts of waste lands and of the most suitable means whereby the detritus from torrential streams may be deposited on such waste lands, so as to reclaim them and convert them gradually into lands suitable for forestry and other agricultural purposes, and at the same time to remove from such streams their burden of detritus so that they may cease to be a menace to the navigable waters of the State.

"In view of the importance of this inquiry to the three great fundamental industries of agriculture, mining and commerce, we beg that this inquiry be undertaken at the earliest opportunity and pushed to completion as rapidly as consistent with thoroughness."

Other resolutions asked for restraining dams and barriers for mining débris upon the tributaries of the Bear, American, Cosumnes, Mokelumne and Calaveras rivers and their respective branches. Congress was requested to establish a department of mineral industries. Amendment of the Code of Civil Procedure was recommended so that, taken in connection with other sections of the statute concerning miners' and material men's liens, the owner of a mine may bond his mine, or enter into agreements concerning the same, and still be able to protect his property against liens for labor and materials for the contracting of which he is not personally responsible. Amendment to Section 2325 of the Revised Statutes was advocated, consisting of the addition of a provision that all patents for mineral lands hereafter granted by authority of the United States shall contain the date of the location of the claim, or claims, upon which the patent is based, and that such statements shall be *prima facie* evidence of such location. The California Congressional delegation was urged to press for the adoption of House Bill No. 8,892, now before Congress. California Congressmen were urged to use every honorable means to have House Bill No. 8,893, otherwise known as the mineral lands bill, made law.

A law was recommended to provide for the filing with registers of the United States land offices of copies of mining claims to be accompanied with a specific description of the lands claimed in such form that the same may be platted on the land office records. The following resolution was adopted relative to the fixing of fares and freights by the Interstate Commerce Commission:

"Resolved, That we urge upon Congress the passage of a law to provide that hereafter, when the Interstate Commerce Commission shall, in any case pending before it, under the act to regulate commerce, approved February 4, 1887, as amended or supplemented by other acts of Congress, decide that a rate for the transportation of freight or passengers is unreasonable or unjust it shall be the duty of the commission to fix a rate in lieu of the rate it has found unreasonable and unjust."

A suitable appropriation for the support of the State Mining Bureau was recommended to the Legislature. The improvement of the navigability of waters of California and the reclamation of waste lands "that may be accomplished without injury to the mining interests of the State" were advocated. The making of a detailed geological map of California was favored, and the governor and Legislature were asked to consider the desirability and propriety of making the necessary appropriation to carry out this work, suggesting that it be performed by the geological department of the University of California.

A resolution of interest to the petroleum miners of California was adopted asking that oil-land locators shall have the advantages accorded to other miners.

The new president, E. H. Benjamin, has not yet appointed the executive or other standing committees, but will shortly do so. It is expected that the association will now enter upon renewed activity in view of the interest manifested by the prominent mining men of the State during the session of the convention.

Lithium melts at 356° F., and has been vaporized at about 1830° F. At temperatures below 392° F. it may be melted in the air without taking fire, but at higher temperatures it emits a strong red flame.

According to W. C. Kerr, the mica veins of North Carolina were worked on a large scale in ancient times, probably by the mound builders. They opened and worked veins down to the water level, and lack of metal tools apparently preventing them from going deeper into the harder rock.

While river waters are universally regarded as 'fresh,' yet the supply of salt in oceans and closed seas is being constantly augmented by the discharges from rivers. Numerous analyses of river waters show that the following are almost always present, though sometimes as mere traces: Sodium, potassium, magnesium, silicon, aluminum and iron.

In Alabama, along a line stretching from Chilton county, northeast through Coosa, Clay and Clebourne counties, there are numerous evidences of prehistoric mica mining. There are many old pits around which pieces of mica may be seen, and in several places large pine trees have grown up on the débris, indicating that at least a few hundred years have elapsed since the mines were worked.

The mica veins of North Carolina are simply dikes of very coarse granite. An idea of the coarseness may be had from the fact that the masses of cleavable feldspar and of quartz (limpid, pale, yellow, brown, or more generally slightly smoky), and of mica, are often found to measure several yards in two or three dimensions, and to weigh several tons. W. C. Kerr states that he has known a single block of mica to make two full two-horse wagonloads, and seen sheets of mica 3 and 4 ft. in diameter.

Muscovite or potassium mica is essentially a silicate of aluminum and potassium, with small amounts of iron, soda, magnesia and water. Its industrial value lies in its great power of resistance to heat and acids, its transparency, and the wonderful fissile property, by virtue of which it may be split into very thin flexible sheets. The limit of thickness—or rather thinness—of sheets is not definitely known.

COPPER MINES OF LAKE SUPERIOR.—XI.

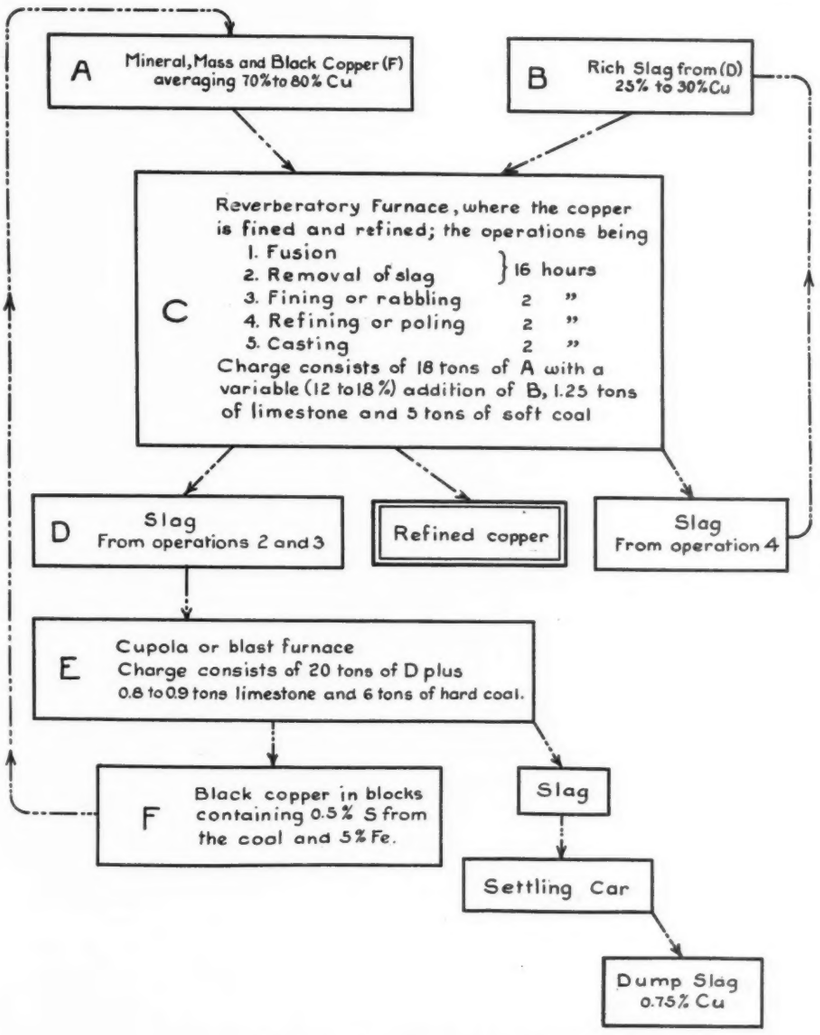
By T. A. RICKARD.

The treatment of ore at the mills yields a product which consists of those various grades of metallic copper called 'mineral.' Some of the mills make as many as five classes, removed at different stages of the dressing; these vary as regards size of particles and in their purity, ranging from slime to walnut size, and from 30 to 75 per cent copper. There is also a large proportion of pieces of metal extracted from the mortar, and in the previous sorting both at mine and mill; this is 'barrel work.' It averages 90 to 95 per cent. Finally, there are the big lumps, ranging from a few pounds to several tons in weight, known as 'mass'. This is nearly clean metal, about 95 per cent copper. Thus, the material which reaches the smelter includes copper in a great diversity of shape, purity and degree of subdivision. On the whole, the average is 60 to 70 per cent copper, with an admixture of heavier constituents of the lode-rock, forming a chemical complex which is essentially aluminum silicate together with varying proportions of iron and lime.

The smelting is fundamentally a melting and refining of a copper product in which the copper is in metallic form mixed with a relatively small percentage of rock impurities. This main operation, which takes place in a reverberatory, is supplemented by the reduction of the resulting slag in a blast furnace, yielding copper blocks which are returned to the reverberatory furnace for final treatment.

The Quincy smelting works are representative of the practice which has prevailed during the last twenty years. This plant is situated on the foreshore of Lake Portage, at Hancock. To Mr. W. P. Smith, the superintendent, I am indebted for every facility for observation, supplemented by courteous explanation.

The product from the mill is discharged from the railroad cars into a storehouse, the 'mineral' arriving in barrels which are emptied into trucks; these pass into the furnace building and are raised by an electric crane so that their contents drop into the hopper situated over the opening in the roof of the furnace. The smaller 'mass' is thrown by hand through the side door of the furnace, and when the lumps are too big for entrance this way they are lowered by the electric crane through the roof-opening. In starting a charge, a small amount of 'mineral' is spread over the bottom and then the heavy pieces of 'mass' are lowered carefully upon this bed. Sometimes an unusually large mass will not permit of even this mode of entry; then it is laid aside until, repairs to the brickwork becoming necessary, the furnace is dismantled; this permits of the mass being placed on the hearth while the top of the furnace is rebuilt over it.


A
Mineral, Mass and Black Copper (F) averaging 70% to 80% Cu
B
Rich Slag from (D) 25% to 30% Cu
C
Reverberatory Furnace, where the copper is fined and refined; the operations being
1. Fusion
2. Removal of slag } 16 hours
3. Fining or rabbling 2 "
4. Refining or poling 2 "
5. Casting 2 "
Charge consists of 18 tons of A with a variable (12 to 18%) addition of B, 1.25 tons of limestone and 5 tons of soft coal
D
Slag From operations 2 and 3
Refined copper
Slag From operation 4
E
Cupola or blast furnace
Charge consists of 20 tons of D plus 0.8 to 0.9 tons limestone and 6 tons of hard coal.
F
Black copper in blocks containing 0.5% S from the coal and 5% Fe.
Slag
Settling Car
Dump Slag 0.75% Cu

TREATMENT DIAGRAM, QUINCY SMELTER.

Each of the four reverberatory furnaces has an average capacity of 400 tons of 'mineral' per month of 24 actual working days. A charge of 36,000 lb. mineral is treated every 24 hours by each furnace, the product being 26,000 lb. copper. The hearth is 10 by 16 feet. As soon as the charge is introduced the melt begins, and after a couple of hours the skimming of slag commences. About 15 to 16 hours are required to complete the treatment, the remaining 8 or 9 hours being consumed in ladling, cleaning up and re-charging the furnace for the next melt.

Before the copper is removed, poles of poplar, 16 to 18 ft. long, are introduced through the furnace door into the molten bath of metal, which is stirred by them, in order that the carbon of the wood may reduce the copper oxide. The ladling then follows; the liquid metal being poured either simply by hand or with mechanical aid. At one furnace the ladle was hung on a traveler, permitting of adjustable leverage, and readily controlled by the workman, so that each of two men alternately dipped a ladle carrying 90 lb. copper, the dipping being finished in 1½ hours; at another furnace, on the other side of the building, I witnessed the older fashion of hand-pouring with 30-lb. ladles, three men requiring three hours to "dip the charge."

The slag from the reverberatories contains 12 to 18 per cent copper; it is drawn off into pots which go to a blast furnace, but the richer slag, skimmed after the final poling and containing 25 to 30 per cent copper, goes back into the reverberatory and forms part of the succeeding charge. The blast furnace is a cupola, 38 by 76 in., of standard type; it is operated intermittently, as material for it accumulates. Lime is added to flux the reverberatory slag and the ash from the fuel consumed, the usual charge containing 20 tons of slag, with about 4 per cent lime and 22 per cent hard coal. The slag from the cupola contains an average of 0.6 to 0.75 per cent copper, a result sufficiently good to speak for itself. What copper it does contain, is half in the form of 'prills' or globules of metal, and the remainder is disseminated unreduced copper oxide.

The copper from the ladles is poured into moulds of varying shape, which in turn are emptied into water to cool, any excrescences are chipped off, and the metal then goes to the warehouse ready for shipment to the market. Four differently shaped products are made: 1. Ingots and ingot bars, each ingot weighing 20 lb. and each bar 60 to 90 lb., these being suitable for casting and for use in brass making, etc. 2. Plates, 100 lb. to 4,000 lb., as required by customers; this material being employed chiefly for rolling into sheet copper. 3. Wirebars, 3 to 4½ in. square and 3 to 7½ ft. long, weighing 100 to 480 lb.; these are for manufacturing wire, suitable for electric and other purposes. 4. Anodes in plates about 2 ft. by 3 ft., 1¼ in. thick, weighing 250 lb., which are smelted from 'mineral' containing 60 to 70 oz. silver per ton; the two metals being subsequently separated by electrolytic refining.

All the copper product has a conductivity of at least 99. The reverberatory furnaces

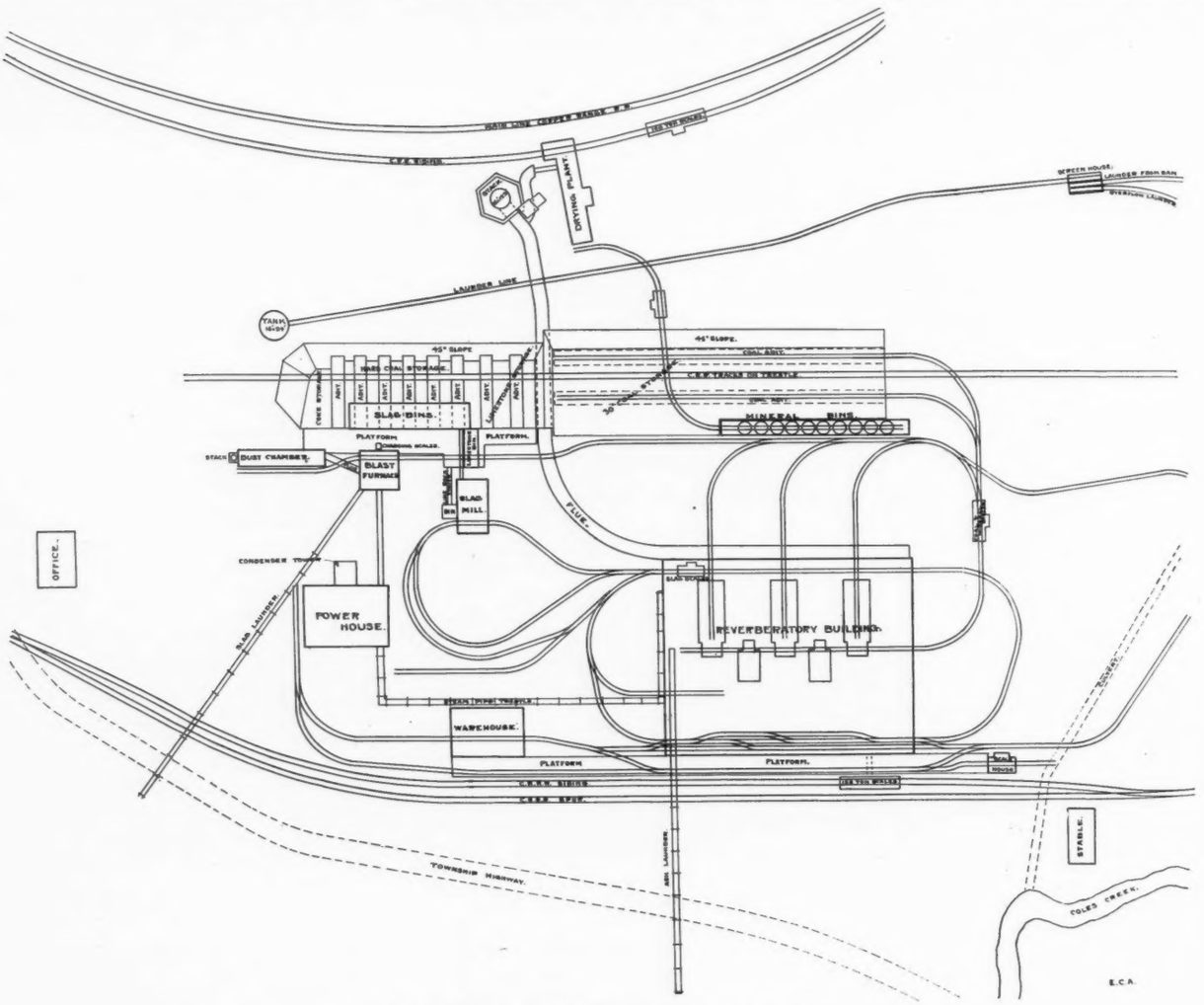
are rebuilt every 8 or 10 weeks. Several additions and improvements are being designed, especially for the discharge and storing of 'mineral' as it comes from the several mines which are contributory to this smelter. In default of any systematic sampling it is difficult for the smelter manager to arrive accurately at the metal contents of the material he treats. The 'mass' copper is extremely irregular in shape and carries a varying proportion of adhering rock. Even the 'mineral,' which comes in barrels, is difficult to average, because any single barrel may contain several grades of product in layers by no means parallel to each other, so that the 'tester' used at the mills will give an inaccurate result. I watched several barrels while they were being emptied and noted that they contained a mixed product thus carelessly arranged. This part of the operation merits keener attention, and will demand it if the smelter is to check the work of the mill.

On the other side of Portage Lake and about three miles west of Houghton, there is the new plant of the Michigan Smelting Company, an enterprise organized to treat the product of the mines on the South Range. This smelter had just been built within the preceding twelve months, despite the severity of the winter cold, and represented the outcome of unusual energy and skill. Although a temperature of -20° F. was not uncommon during the period of construction, and -10° F. was considered relatively mild weather, the walls and foundations appeared not to have suffered. The accompanying plan explains the arrangement of the plant. To Mr. F. I. Cairns, the manager, I am indebted for many of the details which follow.

The works are built upon a terraced slope, the copper product from the mills being delivered by the railroad in bottom-dump cars sufficiently tight to render the finer stuff safe from leakage. The 'mineral' is dumped into a dryer, a revolving cylinder slightly inclined 72 in. diameter and 30 ft. long. This dryer is the A 9 machine of the Ruggles Coles Engineering Company, and has a capacity of 15 tons per hour. Drying is required in order to prevent the freezing of the 'mineral' in the bins during winter, and also to facilitate sampling. 'Mass' and 'barrel work' copper is neither dried nor sampled, but is sent direct to the melting furnace.

After sampling the mineral goes to the bins; they are vertical cylinders of sheet steel, 12 ft. diam. and 30 ft. high. The design of them is borrowed from grain-elevator practice, such as is to be seen on the outskirts of Chicago. This form of construction is best capable of taking the strains developed by the outward pressure, which are resisted by the tensile strength of the steel plates, the high density of the mineral rendering wooden bins of ordinary construction less suitable for the purpose. These bins are 10 in number and hold 250 tons apiece. From them the mineral is taken in bottom-dump cars along a track above the smelting furnaces, to be discharged into the latter through hoppers.

There are three melting furnaces, each having a hearth 18 ft. wide and 50 ft. long, with a daily capacity of 100 tons of mineral averaging, say, 50 per cent copper. It remains to be seen what the furnaces are capable of doing, but 150 tons is regarded as a reasonable maximum capacity. Some iron was added at first, say, up to 6 per cent, in order to take off the excess of alumina in the rock impurities accompanying the mineral. This iron was a hematite from Crystal Falls, and was considered to ensure a more liquid slag than if dependence were put on the lime present in the 'mineral.' But this addition of iron has been found unnecessary. Slags contain 15 per cent alumina and there is enough lime in the charge to keep them liquid. Thirty tons of mineral is fed into the furnace at a time, the resulting metal being supplied to the 'casting' or refining furnace intermittently in charges of 50 tons. The copper runs from the melting furnace to the refining furnace, which is 5 ft. lower, along a launder 21 ft. long, there being no trouble in keeping the metal liquid for this distance.



PLAN OF MICHIGAN SMELTING COMPANY'S WORKS.

There are two refining furnaces, each with a hearth 14 ft. wide and 23 ft. long, and so arranged as to take the product of the three melting furnaces, the central of these tapping to either of the former. At present the two casting furnaces together treat two charges per day, but this rate of operation will be expedited when the plant gets into full working order.

The slag from all the reverberatories goes to a blast furnace of standard design, 38 in. by 120 in. Slag is skimmed into large cast-iron rectangular pots, 10 in. by 24 in. by 60 in., holding 1,000 lb., which are carried on trucks and drawn by an electric locomotive to the rock-breaker, a 15 by 30-in. Blake crusher. The pots are emptied into the jaws of the breaker by an overhead pneumatic crawl, and the broken product is sampled before being elevated to the bins above the blast furnace. The copper from this furnace is cast into moulds, chilled, and then transferred to the refining furnaces by electric traction and crane. The slag from the blast furnace is granulated and then run out by launder to the lake.

In the large furnace-house there is a traveling electric crane, so that what with the fullest use of gravity and mechanical devices generally, there is the least possible amount of manual labor employed in the handling of material. The chipping of the ingots, to take off excrescences, is done by hand, though it might well be done with a pneumatic chisel, the compressed air for which is already available.

It will be seen from the descriptions of the two establishments, one old and the other just built, that the essentials of the smelting operations have not been changed in the new works, which, however, exemplify the constant effort of the modern man to eliminate manual labor in all mining and metallurgical enterprises.

NITROGEN FROM THE AIR.—The Birkeland-Eyde process for atmospheric nitrite and nitrate consists in the use of an arc, which is caused to vibrate by an electro-magnet. The arc is fed from an alternating current, and the electro-magnet from a direct current. The outgoing current of air contains from 2 to 3 per cent of nitric oxide or the equivalent. A yield was obtained of 900 kg. of nitric acid per kilowatt year.

A NOVEL IRON DETERMINATION.—It is proposed by Tarugi and Silvatici (*Chemische Centralblatt*, 1904, 2, p. 1341) to titrate iron, not from the ferrous to the ferric direction, as is done when using potassium permanganate or dichromate, but in the reverse direction, namely, from the ferric to the ferrous. Ferric chloride is titrated down by potassium oxalate, using a few drops of a sulpho-cyanate as indicator. The final tint is a characteristic yellowish-green. The method will surely be subjected to criticism, and it can hardly be suitable for all cases; but it is said to work well for the quick estimate of ores, as wolfranium, silicon, iron and manganese may be determined in the same sample. It would be interesting to know how the new method for iron would apply in the testing of slags.

About 68 amperes of current are required to run a 1,200-candle-power arc lamp.

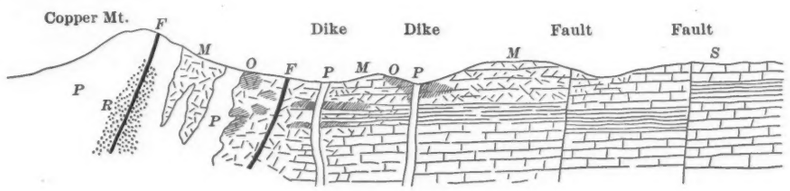
THE GENESIS OF COPPER DEPOSITS.*

By WALDEMAR LINDGREN.

The geographical distribubtion of the copper deposits is practically coextensive with a great porphyry-stock and its dike systems. The deposits occur either in the porphyry or close to its contacts, or along dikes of porphyry in some other rock. Areas in which no intrusions have taken place are practically barren. This intimate connection with the porphyry is certainly an important fact.

In all the deposits copper is the most valuable metal. Gold and silver occur only in minute quantities, except in some of the outlying districts. The two most important mining centers, Morenci and Metcalf, which are three miles apart, are both situated at the main contact of the porphyry-stock and the series of paleozoic limestones. Elsewhere the intrusive rock generally adjoins granite or cretaceous sediments.

The ores consist of chalcocite, chalcopyrite, malachite, azurite, chrysocolla, brochantite, cuprite and native copper. Covellite and bornite are practically absent. Brochantite, the basic copper sulphate, is commonly present, especially in the oxidized veins in porphyry, and, in fact, constitutes in places an important ore. On account of its similarity to and intimate intergrowth with malachite, it has usually been overlooked.



P. Porphyry *M.* Metamorphosed limestone and shale
S. Unaltered sediments *O.* Contact metamorphic ores.
F. Fissure veins. *E.* Disseminated chalcocite.

Scale about 1000 feet to 1 inch.

DIAGRAM OF ORE OCCURRENCE AT MORENCI.

Both the porphyry and the contact-zone are traversed by fissure-veins which carry pyrite with a small quantity of chalcopyrite, zinc-blende and molybdenite, whenever oxidation has not changed these minerals. These pyritic veins are of low tenor; they consist of prevailingly granular or massive minerals with a little quartz gangue, and are believed to have been formed by pyritic replacement along well-defined fissure planes. In the porphyry these veins are surrounded by wide zones in which the rock is greatly altered by the introduction of sericite and pyrite. The process produces bleached rocks of varying hardness in which all of the feldspar has been replaced by sericite and some pyrite. The biotite and hornblende are transformed into chlorite and serpentine, while the silica remains almost constant. All of the lime and soda is eliminated, while potash is greatly increased; no carbonates form during this process.

Little alteration is noted where fissure-veins cut through contact-metamorphic shale, nor when highly altered garnet-magnetite rock forms the walls, but in unaltered or slightly metamorphosed limestone a change is observed. For a short distance from the vein the rock is bleached and converted into tremolite, more rarely diopside, with disseminated pyrite, chalcopyrite and zinc-blende, all intergrown with magnetite. This alteration involves a loss of carbon dioxide and some lime, as well as addition of silica, iron, magnesia, and the sulphides mentioned above. More rarely argillaceous limestones are altered to sericitic minerals with magnetite and sulphides. Although it occurs in the altered country rock no magnetite has been observed in the massive pyritic veins.

The alteration of limestone along fissure-veins to tremolite (or diopside) with magnetite and sulphide is novel. Ordinarily, limestone alters next to fissure-veins to dolomite or quartz or jasperoids.[1] The addition of silica and iron, and the mineralogical result of the hydrothermal process at Morenci, undoubtedly connects it in some way with contact-metamorphism. It is also probable that an alteration of this kind took place at high temperature comparatively soon after the solidification of the porphyry.

At first glance, it might seem plausible to assign all the changes which have taken place in the metamorphic zone to the same hydrothermal alteration which has affected the porphyry along the fissure-veins. This view, however tempting, is surely incorrect. Instead of one set of phenomena, there are two related and, in part, superimposed processes. Among the proofs of this are the absence of sericitization in the porphyry of many dikes which have exerted strong contact-metamorphism. Further, the entire independence which the masses of extremely altered garnet-magnetite rock show in regard to the fissure-veins, and their distinct dependence on contact of dikes and main stock. The vein alteration produces dull, earthy rocks from the limestone, while contact-metamorphism results in hard, compact and granular rocks. On the other hand, there is undoubtedly a certain relation between the two processes, for amphibole (and pyroxene) occurs in the true contact-metamorphic rocks; and the intergrowth of magnetite and pyrite is characteristic of both. I conclude that after the completion of the contact-metamorphism, properly speaking, and after the consolidation of the porphyry, an extensive fissuring took place, and solutions derived from the cooling porphyry, probably ascending and laterally extending from this rock, flowed through these fissures. Everything indicates that these solutions were closely related to those which emanated from the magma at the moment of intrusion, and, in fact, were similar in general composition.

Under influence of surface waters, but pro-

* Abstract of paper entitled 'The Genesis of the Copper Deposits of Clifton-Morenci, Arizona,' by Waldemar Lindgren, Washington, D. C. American Institute of Mining Engineers, September, 1904.

[1] W. Lindgren, 'Metasomatic Processes in Fissure Veins,' *Transactions*, American Institute of Mining Engineers, Vol. XXX, p. 578.

tected from direct oxidation, chlorite and serpentine form from the tremolite and diopside of the contact zones, while garnet is little altered. Under direct oxidizing action garnet changes to limonite and quartz, while lime is probably carried away as carbonate. Tremolite and related minerals are similarly affected. Magnetite oxidizes to hematite and limonite, many large bodies of which are mined for fluxing purposes. Pyrite changes by direct oxidation into ferrous sulphate and free sulphuric acid; the ferrous sulphate upon further oxidation yields ferric sulphate, and the latter is easily decomposed into basic sulphates, ferric hydrates and free acid; ferric sulphate is also ready to attack pyrite and other sulphides, changing them to sulphates and being itself reduced to ferrous sulphate. This cycle of reactions will finally transform all of the sulphides present into various, more or less soluble, oxy-salts. A large part of the pyrite will be changed to limonite. Such 'iron caps' are seen at the outcrops of many veins in regions where oxidation proceeds undisturbed by erosion, but in this region they are generally absent.

The veins are marked by silicious outcrops, either entirely barren or containing small amounts of oxidized copper ores. No basic ferric sulphates have been seen either in the mines or on the surface. The waters percolating downwards must soon have lost their oxygen, and, for the alteration at greater depths, ferrous sulphate and diluted sulphuric acid are probably the only re-agents of importance resulting from the pyrite. It is clear that the upper part of the veins have not been formed by simple oxidation of pyrite and accumulation of limonite.

Direct oxidation of chalcopyrite yields cupric and ferrous sulphates, while the zinc-blende produces zinc sulphate; both of these processes are in evidence wherever the disseminated sulphides in the metamorphic rocks are exposed to oxidation. The general order of attack of oxygen is usually stated as follows: Arsenopyrite (most easily attacked), pyrite, chalcopyrite, blende, galena, and, finally, chalcocite (most difficultly attacked). This rule is probably true only for one set of conditions as to mass, aggregate and character of solutions. Very marked exceptions from it occur at Morenci.

Sulphate Waters.—Descending waters which form a lode of decomposing pyrite, chalcopyrite and zinc-blende should contain chiefly ferrous, cupric and zinc sulphates, together with free sulphuric acid. The first two salts are easily soluble, but far more so is the zinc sulphate. Cuprous sulphate is stable only under certain conditions and is not believed to be an important re-agent, though it may form during subsidiary or intermediate reactions. Its presence in mine waters has not been satisfactorily proved. In this district some moisture percolates the upper workings, as shown by efflorescences and stalactites of sulphates, but the mines are practically dry. In the porous porphyry the moisture spreads easily, while the hard metamorphic rocks offer considerable resistance.

Processes in Fissure-Veins.—Below the region of oxidizing influences the veins consist of pyrite, chalcopyrite and zinc-blende, while the upper few hundred feet contain chalcocite and oxidized copper ores. The most important action of the descending sulphate solutions has been a development of chalcocite by the action of cupric sulphate on primary pyrite ore; this process began at the time the veins were first touched by oxidizing waters, and continues to some extent to the present time.

If secondary deposition of sulphides has taken place according to Schermann's reactions they should be arranged in the upper zones of the deposit in the following order: (*top*), galena, zinc-blende, chalcocite, bornite, chalcopyrite and pyrite (*bottom*). In Morenci practically only chalcocite thus forms. The first of the primary minerals attacked is the zinc-blende which appears to be rapidly transformed into covellite, as follows:

$$ZnS + CuSO_4 = ZnSO_4 + CuS.$$

Later it is changed into chalcocite.

Chalcopyrite, present only in small quantities, is probably attacked at the same time. The zinc sulphate is carried away and no zinc minerals appear in the upper, oxidized part of the veins. Contrary to the list just given above, blende is thus attacked before the pyrite. The conversion of pyrite to chalcocite may be studied in all stages of the process; it is a molecular replacement attacking the pyrite from cracks and fissures, and gradually eliminating it entirely. However, even in the best chalcocite ores residual pyritic cores ordinarily remain. Dr. Stokes has shown that the reaction at + 100° C. and + 200° C. proceeds as follows:

$$5\ FeS_2 + 14\ CuSO_4 + 12\ H_2O = 7\ Cu_2S + 5\ FeSO_4 + 9\ H_2SO_4 + 3\ H_2SO_4.$$

The last H_2SO_4 being formed by oxidation of the sulphur of FeS_2. It is probable that the reaction likewise goes on, though more slowly, between + 100° C. and + 20° C., the range probably existing in the deposit during the period of oxidation. Mr. H. V. Winchell's reaction[2] necessitates sulphurous acid as a reagent, the presence of which seems unlikely. The equations given by Prof. Hise[3] for the formation of secondary copper sulphides seem improbable, as they require the presence of free oxygen, and as they are generally based on cuprous sulphate.

By this chalcocitization the massive pyritic veins have been transformed into almost solid, dull, sooty chalcocite, and the zones of dissemination surrounding them in the porphyry have changed into low-grade chalcocite ores. The process is accompanied by the formation of some kaolin, quartz, chalcedony, and probably also opal. No sericite forms. The kaolin develops metasomatically at the expense of the sericite, and sulphuric acid was evidently the reagent. Alunite is in places formed in the same manner. Extremely large amounts of ferrous sulphate must have been carried away during this process.

Oxidation of Chalcocite.—After a large part of the chalcocite in the lode had been formed, there came a time when erosion and degradation, working faster than oxidation, began to expose the upper part of the chalcocite zone to active and direct attack by oxygen. Practically all of the veins are in this stage. The present zones of active oxidation are therefore due, not to direct oxidation of the primary lode, but to the destruction of the upper horizon of the chalocite zone. As reagents, there are here ferrous sulphate, sulphuric acid, cupric sulphate and free oxygen. Any ferric sulphate present would soon be reduced to ferrous salt by the abundant pyrite. Chalcocite changes to cuprite and cupric sulphate, sometimes with an intermediate stage of covellite.

$$2\ Cu_2S + O = 2\ CuS + Cu_2O \text{ and } CuS + 4O = CuSO_4.$$

Cuprite partly reduced to metallic copper is, in fact, abundantly present in the upper limit of the chalcocite zone.

$$Cu_2O + H_2SO_4 = Cu + CuSO_4 + H_2O.$$

By some process not quite elucidated, chalcocite may, in places, change directly into native copper. The zone of cuprite and metallic copper has rarely great vertical extension, for the reason that both minerals are rapidly converted into cupric sulphate, brochantite, malachite, azurite and chrysocolla; but these products are soon dissolved by free sulphuric acid from pyrite, some of which tenaciously remain until the last, and descend as soluble sulphates to enrich the upper part of the chalcocite zone.

In the copper mountain veins, contained in porphyry, oxidized copper minerals are almost entirely absent, probably because of the great amount of free sulphuric acid present. The chalcocite disappears at from 100 to 200 ft. below the surface, and the lode consists of a rusty mass of sericitized porphyry, with considerable amounts of remaining pyrite and efflorescences of cupric sulphate. The last particles of pyrite only disappear close to the surface. In places chalcocite may change directly into brochantite or malachite. Cupric oxide (melaconite or tenorite) has not been found.

Oxidizing Processes in Limestone.—The processes which have resulted in the oxidized deposits now forming irregular or tabular masses in limestone or shale, and not connected with fissures, are materially different from those occurring in the lodes. In most cases the original material consisted of disseminated lean pyritic ores, containing pyrite, chalcopyrite, zinc-blende, and magnetite, locally more or less concentrated in irregular masses, or following certain strata- or dike-contacts. Free oxygen and sulphuric acid, ferrous and cupric sulphates, with an abundance of calcium carbonate, formed the reagents. Though oxygen and carbon dioxide may in part have produced limonite and malachite directly from pyrite and chalcopyrite, the most important reactions doubtless were those between calcium carbonate and sulphate solutions, partly derived from nearer the surface.

$$2\ CuSO_4 + CaCO_3 + 2\ H_2O = (CuO)_2,\ CO_2,\ H_2O + 2\ CaSO_4 + H_2SO_4.$$

$$3\ CuSO_4 + 2\ CaCO_3 + 2\ H_2O = (CuO)_3,\ 2\ CO_2,\ H_2O + 2\ CaSO_4 + H_2SO_4.$$

In the first case malachite, in the second azurite, forms, together with gypsum. The latter mineral, though largely carried away in solutions, is not uncommon in these deposits in Morenci. Ferric hydrate will be produced from ferrous sulphate and calcium carbonate. Thus, in general, is explained the constant occurrence in these deposits of malachite, azurite and limonite. Crusts of replacing malachite and azurite frequently surround residual, rounded masses of limestone. The gangue of garnet and magnetite alters to ferric hydrate and quartz. Chrysocolla forms when silica is plentiful; zinc minerals are not uncommon in these deposits, and efflorescences of the zinc and magnesia sulphates sometimes cover the tunnel walls. During the process outlined above lime is almost wholly eliminated, while alumina forms residual concentrations.

[2] 'Synthesis of Chalcocite.' *Bulletin* of the Geological Society of America, Vol. XIV, pp. 269-276.

[3] 'Some Principles Controlling the Deposition of Ores.' *Transactions* American Institute of Mining Engineers, Vol. XXX, pp. 101, 111, 112.

FATAL ACCIDENTS IN COAL MINING IN 1903.

By FREDERICK L. HOFFMAN.

During 1903 there were 1,760 deaths in and about American coal mines, as far as the returns are available. The data are incomplete, in that the returns for Kentucky and Maryland for 1903 have not been made public, and all efforts to obtain the same by correspondence have been fruitless. This accounts for the long delay in the publication of this annual review of coal-mining-accident statistics in North America. The fatal accident rate during 1903 was 3.19 per 1,000 employees, against an average of 2.94 for the ten-year period 1894-1903. The rate was somewhat lower than the rate for the preceding year, which was 3.49 per 1,000. The rates remain unreasonably high, and the loss of life incident to coal-mining operations is much greater than it ought to be in the light of our increasing knowledge regarding the true causes of coal-mining accidents. The prompt issue by every State of a return of the annual loss of life would, no doubt, do much to attract public attention and prove helpful in advancing necessary measures and methods of reform. There appears to be no necessity for delay in furnishing information as to the actual number of deaths in coal mines in advance of the final publication of the facts in the form of a report, which, especially in the case of States issuing biennial reports, means the withholding of important information from the public at a time when practical use could be made of the facts.

The first table shows the actual number of persons killed while engaged in coal mining in the United States and Canada during each of the years 1894-1903. Proper distinction is made in the returns for Pennsylvania, showing respectively the number of persons killed in the anthracite and bituminous regions.

According to this table there have been 1,760 deaths in coal-mining operations during the year 1903. If the probable number of deaths in Kentucky and Maryland were added, the total would be approximately 1,800 deaths in coal-mining operations in North America during the course of a single year. As has been pointed out in previous reviews, the actual number of deaths is probably from 5 to 10 per cent larger, since casualties are sometimes not reported for a number of small mines, as not falling within the scope of State supervision, and deaths resulting from accidents after a long illness are not generally reported to the authorities.

The second table shows the corresponding fatal accident rates per 1,000 of persons employed. This method of reporting the relative mortality is, after all, the one which commends itself as being of the greatest practical utility, especially when comparisons are to be made of the accident frequency in different occupations. The often suggested method of taking into account the actual working time would be more desirable, if such a method could be generally employed in other industries. It is the method which is made use of in the government statistics of the Imperial Insurance Department of Germany, and one which has much to commend it, but the present state of mining statistics is not such as to enable us to make use of this method for this country. Its value, however, is illustrated by the abnormal returns for the anthracite mines of Pennsylvania for 1902, as the result of the great strike.

While the average accident rate for the decade under observation was 2.94 per 1,000, the rate during 1903 was 3.19, showing an actual, as well as material, increase in the ratio of fatalities in mining operations. If the returns are examined with special reference to individual States, it will be observed that the rates during 1903 were highest in British Columbia, New Mexico, Indian Territory, Washington, Colorado and West Virginia. In these States the rates during 1903 were in excess of 4 per 1,000. The rates were lowest in Iowa and Missouri. In all the other States the rates were in excess of 2 per 1,000, which is higher than would seem warranted by the most satisfactory experience in certain States of this country, or in certain other important coal mining countries of the world.

A complete analysis of the coal mining statistics should include the causes of accidents and their relation to occupation, nativity, length of employment, etc. Such a comprehensive analysis, however, falls more properly within the scope of a central government bureau, which should require uniform statistics from the different States. At present such uniformity does not exist. It requires, however, but a superficial study of the facts to disclose the alarming frequency of deaths resulting from falls of roof. In the anthracite mines of Pennsylvania, for illustration, 49.3 per cent of the fatal accidents inside of mines were due to falls of coal, slate, roof, etc. The well-known Chief of the Bureau of Mines, Mr. James F. Roderick, properly calls attention to this fact in his recent report on the anthracite industry, and his conclusions apply equally to coal mining accidents in North America in general.

"During the past twenty years more than 50 per cent of the accidents were caused by falls, but there is no reason why the number from this fall should not be reduced by at least 50 per cent. If as much care were taken to guard against falls of coal, roof and sides, as is taken in regard to ventilation, for the purpose of keeping the mines clear of what is generally called the deadly gas, a stringent rule would be adopted against the more deadly falls. In the last twenty years, for every person killed by an explosion of gas, six persons have been killed by falls. During the year 1902 there were 1,351 persons acting as firebosses, whose duty it was to see every day that the mines were kept clear from the deadly gas; but there was no person engaged to look after the men doing the actual mining of coal. The law provides that the mine foreman, or his assistant, shall visit and examine every working place in the mine at least once every alternate day, while the men of such place are, or should be, at work and shall direct that each and every working place is properly secured by props or timbers, and that safety in all respects is assured by directing that all loose coal or rock shall be pulled down or secured, and that no person shall be permitted to work in an unsafe place, unless it be for the purpose of making it secure."

For ready comparison, the data have been brought together for individual years since 1894, in continuation of previous annual reviews on this subject, to enable the reader to compare the fatal accident rate of mining employees with the experience in other employments during a period of ten years.

NUMBER OF PERSONS KILLED BY ACCIDENTS IN COAL MINES OF THE UNITED STATES AND CANADA. 1894–1903.

	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	Total.
Alabama	19	38	28	38	45	40	37	41	50	57	393
Colorado	19	23	68	35	24	41	29	55	73	44	411
Illinois	72	75	77	69	75	84	94	99	99	156	900
Indiana	(a)	23	28	16	22	16	18	24	24	55	226
Indian Ter.	13	6	12	22	17	25	40	44	60	33	272
Iowa	19	20	22	21	26	20	29	26	55	21	(b)259
Kansas	26	10	12	6	17	16	22	26	27	36	198
Kentucky	10	8	6	12	6	7	17	21	19	(a)	(b)106
Maryland	7	9	6	5	4	5	7	12	11	(a)	(b)66
Missouri	19	13	16	8	9	14	10	15	10	17	131
New Mexico	(a)	28	7	7	7	15	15	9	17	17	122
Ohio	45	52	41	40	52	57	68	72	81	114	622
Pennsylvania (anthr.)	446	421	502	423	411	461	411	513	300	518	4,406
Pennsylvania (bit.)	122	156	180	150	199	258	265	301	456	402	2,489
Tennessee	14	37	22	10	19	20	10	53	226	26	437
Utah	(a)	1	3	3	3	—	209	10	8	7	244
Washington	50	35	8	7	9	45	33	27	34	25	273
West Virginia	59	83	65	62	90	89	141	130	120	159	998
British Columbia	4	10	9	6	7	11	17	102	139	42	347
Nova Scotia	13	9	8	7	7	19	21	14	19	31	148
Total Deaths	957	1,057	1,120	947	1,049	1,243	1,493	1,594	1,828	1,760	13,048

(a) No report. (b) Total for 1894–1902.

FATAL ACCIDENTS IN COAL MINING IN THE UNITED STATES AND CANADA. 1894-1903.

NUMBER OF PERSONS KILLED PER 1,000 EMPLOYED.

	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	Total.
Alabama	2.13	4.61	2.83	3.07	4.55	3.10	2.59	2.90	2.79	2.94	3.07
Colorado	3.06	3.05	10.07	4.99	3.23	5.60	3.99	6.88	8.11	4.27	5.35
Illinois	2.21	2.35	2.33	2.04	2.14	2.27	2.39	2.24	2.15	3.13	2.35
Indiana	(a)	2.92	3.94	2.00	2.63	2.07	1.82	1.98	1.83	3.64	2.53
Indian Ter.	3.95	1.64	3.26	6.34	4.82	6.24	7.59	8.35	9.62	5.42	6.11
Iowa	1.85	1.82	2.62	2.45	3.38	2.49	2.22	1.97	4.23	1.59	2.44
Kansas	2.58	1.11	1.36	0.71	1.95	1.57	2.06	2.28	2.70	3.61	2.03
Kentucky	1.25	1.02	0.79	1.55	0.67	0.83	2.06	2.14	1.58	(a)	(b)1.35
Maryland	1.69	2.30	1.58	1.17	0.89	1.08	1.32	2.23	1.99	(a)	(b)1.59
Missouri	2.49	1.84	2.43	1.22	1.22	1.80	1.31	1.63	1.09	1.85	1.67
New Mexico	(a)	16.88	4.87	5.13	3.71	7.98	7.44	4.81	10.11	7.26	7.56
Ohio	1.43	1.79	1.44	1.39	1.77	2.03	2.14	2.15	2.16	2.75	1.95
Penna. (anthr.)	3.19	2.93	3.35	2.83	2.89	3.28	2.86	3.47	2.03	3.41	3.02
Penna. (bit.)	1.44	1.83	2.14	1.72	2.27	2.82	2.43	2.56	3.37	2.65	2.41
Tennessee	2.53	7.23	3.37	1.58	2.43	2.60	1.15	6.10	25.80	2.69	5.84
Utah	(a)	1.49	4.35	4.17	4.38	——	138.96	5.81	3.24	3.21	20.75
Washington	14.79	12.38	2.98	2.48	2.70	13.60	7.79	5.59	7.83	5.13	7.45
West Va	2.98	3.97	2.68	2.89	3.86	3.55	5.03	4.01	3.78	4.03	3.75
Br. Columbia	1.37	3.42	3.27	2.47	2.34	2.91	4.22	25.67	34.65	9.85	10.18
Nova Scotia	2.41	1.55	1.33	1.35	1.56	3.39	3.17	1.83	2.36	2.79	2.25
Total	2.48	2.67	2.79	2.34	2.59	2.98	3.24	3.24	3.49	3.19	2.94

(a) No report. (b) Average rate for 1894–1902.

A DECADE OF FATAL ACCIDENTS IN COAL MINING IN NORTH AMERICA, 1894–1903.

Years.	Employees.	Killed.	Rate per 1,000.
1894	385,579	957	2.48
1895	395,549	1,057	2.67
1896	401,874	1,120	2.79
1897	405,433	947	2.34
1898	405,600	1,049	2.59
1899	416,596	1,243	2.98
1900	460,670	1,493	3.24
1901	492,529	1,594	3.24
1902	524,028	1,828	3.49
1903	551,874	1,760	3.19
1894–1898	1,994,035	5,130	2.57
1898–1903	2,445,697	7,918	3.24
Total	4,439,732	13,048	2.94

NOTE.—For Kentucky and Maryland, 1903, the information is not available.

While the rate for 1903 was above the aver-

age for the ten-year period, it was somewhat below the average for 1902. In the aggregate it is shown that during the ten-year period over 13,000 miners and other employees have been killed as the result of coal mining operations in North America. The economic loss to the nation and to the companies cannot be estimated merely by the number of deaths as set forth in this table. It requires no actuarial calculation to prove that the economic loss to the different States and to the nation, warrants more careful consideration than the subject has received in recent years.

A further comparison of the coal-mining-accident statistics for recent years is made in the following table, showing the average number of accidents and the corresponding rates per 1,000 employed during the period 1898-1902 and the year 1903:

FATAL ACCIDENTS IN COAL MINES IN UNITED STATES AND CANADA.

COMPARISON OF 1903 WITH FIVE PREVIOUS YEARS.

States.	No. of Persons Killed. (Yearly Average.) 1898–1902.	1903.	Rate per 1,000 Employed. 1898–1902.	1903.	Increase or Decrease per 1,000 Employed. 1903.
Alabama	43	57	3.08	2.94	− 0.14
Colorado	44	44	5.69	4.27	− 1.42
Illinois	90	156	2.24	3.13	+ 0.89
Indiana	21	55	2.03	3.64	+ 1.61
Indian Ter.	37	33	7.65	5.42	− 2.23
Iowa	31	21	2.84	1.59	− 1.25
Kansas	22	36	2.12	3.61	+ 1.49
Kentucky	14	(a)	1.48	(a)	(a)
Maryland	8	(a)	1.54	(a)	(a)
Missouri	12	17	1.41	1.85	+ 0.44
New Mexico	13	17	6 75	7.26	+ 0.51
Ohio	66	114	2.06	2.75	+ 0.69
Penna. (anthr.)	419	518	2.90	3.41	+ 0.51
Penna. (bit.)	296	402	2.73	2.65	− 0.08
Tennessee	66	26	7.87	2.69	− 5.18
Utah	46	7	30.69	3.21	−27.48
Washington	30	25	7.38	5.13	− 2.25
West Virginia	114	159	4.05	4.03	− 0.02
British Columbia	55	42	14.69	9.85	− 4.84
Nova Scotia	16	31	2.47	2.79	+ 0.32
Total	1,443	1,760	3.13	2.98	− 0.15

(a) Information not available.

This table exhibits a slightly lower rate of fatality during 1903 than was shown to prevail during the preceding five years. The mortality of employees in the anthracite mines of Pennsylvania was higher for 1903, but this was to be expected because of the abnormal conditions of 1902, which affect the average rate for the five-year period. In seven States the rates were higher during 1903, but the variations are not marked. The largest increases occurred in Indiana and Kansas, but the rates during 1903 were unusually high for many States which, as a rule, return a low accident mortality.

FATAL ACCIDENTS IN COAL MINING — INTERNATIONAL COMPARISON. 1898–1902.

States and Countries.	Total No. Employees in 5 Years.	Total No. Killed in 5 Years.	Accident Rate per 1,000 Employees
British Columbia	18,784	276	14.69
Tennessee	41,655	328	7.87
Natal	13,616	80	5.88
West Virginia	140,585	570	4.05
New South Wales	58,062	181	3.12
Alabama	69,156	213	3.08
Pennsylvania (anthr.)	722,621	2,096	2.90
Iowa	54,936	156	2.84
Pennsylvania (bit.)	541,248	1,479	2.73
Nova Scotia	32,450	80	2.47
Prussia (bit.)	1,865,802	4,348	2.33
Illinois	201,549	451	2.24
Prussia (brown coal)	207,645	460	2.22
Kansas	50,985	108	2.12
Victoria	4,710	10	2.12
Ohio	160,021	330	2.06
Indiana	51,198	104	2.03
Queensland	6,268	12	1.91
Austria (brown coal)	216,340	396	1.83(a)
Kentucky	47,444	70	1.48
Missouri	41,220	58	1.41
United Kingdom	3,789,859	4,992	1.32
France	793,236	975	1.23
Belgium	649,834	734	1.13
Austria (bit.)	260,678	279	1.07(a)
New Zealand	12,255	13	1.06
India	421,810	352	0.83
Total	10,473,967	19,151	1.83

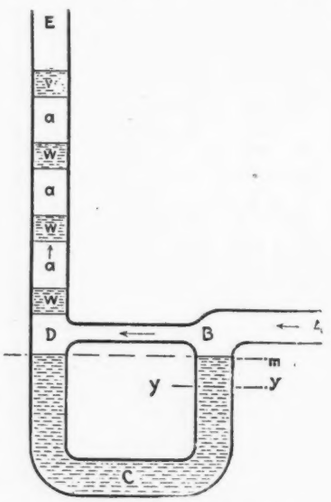
(a) Average rate for four years, data for 1900 not being available.

As a departure from the usual character of this review during previous years, I add a table showing the fatal accidents in coal mining in the principal coal-producing countries of the word. See preceding column.

All international comparisons have their limitations and are subject to the serious criticism that different methods used in reporting accidents, as well as other facts, are likely to be overlooked, and that, therefore, such comparisons may be unfair to some countries and too favorable to others. A further limitation in such a comparison is the wide variation in numbers, as, for illustration, the large number employed in the United Kingdom and the small number employed in Victoria and Queensland. Subject to these limitations, the statement is one of much interest. The average fatal accident rate in coal mining operations for all the principal coal-producing countries was 1.83 per 1,000 employees during the five-year period 1898-1902. The rate was highest in British Columbia and lowest in India. Assuming that the average annual rate of 1.83 per 1,000 holds for the remainder of the world, and estimating the approximate number of persons employed in coal-mining operations the world over to be 2,500,000, we have it that on the average almost 5,000 persons are annually killed in the production of the world's coal supply.

AN INGENIOUS AIR-LIFT PUMP.

To force water to a height of 300 ft. with an air pressure of less than 40 lb. per sq. in. seems at first sight an impossibility, says the



MODEL OF AIR-LIFT PUMP.

Engineering News (November 24, 1904), because the water pressure due to a head of 300 ft. is 130 lb. per sq. in. Nevertheless this can be, and has been, done by the novel pump here described.

The method is illustrated in the accompanying engraving, which shows a U-shaped tube filled with water up to the level *m*. Suppose compressed air to enter at *A*, at a pressure of 10. lb. per sq. in. when it reaches the space *B* above the surface of the water. In passing through the tube from *B* to *D* friction reduces the pressure, so that when the air reaches the space *D* it has a pressure of, say, 9.75 lb. per sq. in. The result is that the water in the tube descends on one side to a level *y y*, while it ascends on the other side correspondingly. In round numbers the pressure due to the weight of a column of water is 0.5 lb. per sq. in. for each foot of height of column; hence a difference of 0.25 lb. per sq. in. between the air at *B* and the air at *D* would result in a difference in water level of 6 in. in the opposite legs of the U-tube. But when the water rises at *D*, it shuts off the air coming through the tube *D B*. The instant this occurs, the water begins to rise more rapidly, due to the then unbalanced pressure; and almost immediately, the air in the pipe *B D* forces its way under a portion of the rising column of water in the pipe *D E*, thus separating a piston of water, *w*. A repetition of this process occurs until the pipe *D E* is filled with alternate pistons of water, *w*, and pistons of air, *a*. The air pistons, as they ascend, are constantly expanding, due to the decreasing weight of water above them. Thus, much of the energy of the compressed air is expanded in doing useful work.

The pressure of 40 lb. per sq. in. at the base of the column, therefore, is not lifting a solid mass of water 300 ft. high, but merely a series of water pistons in the pipe 300 ft. high, the sum of their lengths—not more than 17 feet.

In the accompanying engraving there is no valve in the pipe *B D*, but in practice such a valve is inserted, making it possible to throttle the air so as to get a difference of pressure between *B* and *D* that will produce the size of water and air pistons best suited for any given size of delivery pipe, and lift under any given air pressure from the compressor. In practice it has been found desirable to combine two of the elements shown in the accompanying engraving, so that one may be filled by suction while the other is being discharged by the air pressure. An automatic piston alternately connects each of the pump chambers with the exhaust and with the compression end of the air compressor. This necessitates two lines of pipe to the air compressor, but it results in economy of air as well as in ability to work with a pump that is not submerged.

Using a delivery pipe 4 in. in diameter and with a lift of 105 ft., Mr. H. C. Behr made 21 tests under varying air pressures.

Air pressure (above atmosphere) lbs. per sq. in.	% Efficiency of pump.	% Efficiency of compression.	% Total efficiency
41	42.5	69.4	25
33½	48.1	73.8	30.2
29½	40.6	76.3	26.3
29½	46.1	76.7	29.9
24½	39.8	79.5	29.9
24½	50.2	79.5	33.9
23½	40.4	79.8	27.4
19	36.4	84.6	25.5
14½	24.1	85	17.4

The efficiency of the pump itself is high at all pressures, except at the lowest pressure used, namely, 14.5 lb. The last column of total efficiency was calculated by multiplying together the percentages in columns two and three and deducting 15 per cent for friction of the compressor mechanism. Obviously the total efficiency may be materially increased by using a two-stage compound condensing air compressor plant.

This type of pump is especially adapted for mine pumping and for deep well pumping. Because of the fact that a low air pressure will force water up through many hundred feet, it follows that a comparatively light discharge pipe can be used, effecting a saving in the cost of installation. For pumping acid waters, it would be practical to use cheap bored wooden pipe, instead of expensive and heavy iron pipe lagged with wood. Not only can a light piping be used, but the pump itself may be correspondingly light, thus effecting a material saving in first cost, and in transportation. The air compressor itself need not be a large one, provided the quantity of water be not large, even though the lift be a great one.

SMALL SIZE ANTHRACITE.

By Samuel Sanford.

One development of the anthracite industry within the past 25 years has been the change in the relative proportion of large and small coal shipped from the mines. In the early days of the industry, down to about 1850, practically the whole tonnage shipped was a sort of screened run-of-mine, the coal being run over a mud-screen with bars about ½ in. apart, through which pieces of about pea size could fall. This date is approximately fixed by some of the culm banks, the big heaps of mingled impure coal and fine refuse which draw the attention of anyone passing through the anthracite region. In the Schuylkill region, about Mahanoy City, banks or parts of banks piled up before 1850 contain no coal larger than pea. It is likely that the same is true of culm banks in other parts of the anthracite country. Old inhabitants state that shipments from the Lackawanna region, even coal intended for domestic use, were a mixture of lumps of all sizes down to those roughly corresponding to chestnut. In those days, also, a considerable part of the coal broken at the face was not removed from the workings at all, for, as fine stuff was not wanted, the miner collected small lumps with a rake, and what passed through was left.

The immediate cause of the coal being graded into sizes for shipment is uncertain, though it was probably an inevitable outgrowth of the various uses of anthracite fuel. The rapid expansion of the iron industry, with the replacing of charcoal by anthracite as a blast-furnace fuel, was, no doubt, an important factor. The large lumps seem to have been first screened and shipped separately, and then, somewhere between 1850 and 1855, perhaps to suit a demand from householders, rolls, or, as they were first called, crackers, were introduced to break down large lumps and screens to grade the broken lumps into various sizes. Some idea of the proportion of sizes made in the early 60's may be had from the output of the Girard Estate mines in 1863, when sizes over chestnut formed 90 per cent, and chestnut 10 per cent, of the total. Pea size was first separated and shipped in 1867, but the next smaller size, buckwheat No. 1, was not produced until about 1876, and the still smaller size, buckwheat No. 2, or rice, and buckwheat No. 3, or barley, not until 1895.

The use of coal smaller than pea size at points away from the collieries probably grew out of the consumption of 'pea-and-dust,' the screenings made in loading vessels at the docks. As these screenings were the waste from lumps, they were practically pure coal, and were bought by people who appreciated the fact. They sold at a low price, for a long time less than the freight rates from mines to tidewater on the larger sizes.

At the mines the unmarketable small stuff was used as boiler fuel, when the operators began to appreciate the importance of fuel economy. It was the use of pea size and smaller that drew attention to the large amount of such coal, of apparently excellent quality, to be recovered from the old culm banks. After the sizes smaller than No. 1 buckwheat were being recovered, and the anthracite breakers were equipped with suitable devices for the purpose, there was, of course, a great change in the character of the refuse, and the culm banks now accumulating contain little coal of present value, though there is a possibility of their being some day utilized for the manufacture of briquettes. With the old culm piles the case is different; those antedating 1850, as noted, contain no coal larger than pea size, while the great heaps that accumulated between 1855 and 1895 contain sometimes pieces of pure coal as large as egg size, and a considerable proportion of large lumps of mixed coal and slate from which pure coal of chestnut size can be recovered. In the days of the Civil War, for example, when anthracite was in great demand, and certain sizes brought high prices for naval vessels blockading the Southern ports and for blockade runners, there was much carelessness in preparing coal, and a large amount of really good fuel went to the culm bank.

The proportion of large sizes, classified as lump, steamboat and broken, all big enough to pass over a screen with 2¾ in. square mesh, amounted in 1873 to 37.35 per cent of the total output; the proportion of domestic sizes, egg, stove and chestnut, all of which pass over a screen with ¾ in. mesh, was 56.75 per cent, and of pea coal, the smallest size made, 5.92 per cent. In 1903 the proportions shipped were: Large, 12.1 per cent; domestic, 52.5 per cent; pea, 14.4 per cent; buckwheat No. 1 and smaller, 21 per cent.

The rapid increase in the consumption of the small sizes has been due, not only to the low price at which they sell in competition with bituminous coal, but to the improvements made in grates and mechanical draft apparatus by which they are economically burned. The chief use is in cities having ordinances that limit the consumption of bituminous coal by forbidding the escape of dense smoke. Here these sizes, too small for domestic use, are purchased in large quantities by factories, hotels, apartment houses and office buildings for steam production. One hotel in New York uses over 100 tons daily in the winter. The progress of mechanical invention indicates that devices for burning these sizes will be further improved and that the consumption will increase.

Thus, for instance, the size formerly known as steamboat has practically disappeared from the list, the largest size next to lump now shipped being egg coal. The steamboats plying on the Hudson river and on Long Island sound from New York, and in the harbor of Boston, which now are almost the only steamers using anthracite, burn, without exception, a small size, pea or buckwheat. Steamboat size and lump were also at one time used in the locomotives on the railroads in and near the anthracite region; they have now been superseded either by bituminous coal, or by buckwheat or rice coal, burned in fire-boxes especially adapted for their use, like the Wooten and similar types.

When the marketing of coal of buckwheat size had become an established feature of the industry, and the possibility of reclaiming merchantable coal from the culm banks was an alluring proposition, experimental plants were erected, and by 1890 there were several such working on a commercial scale, separating the coal by washing and screening. The total output of washery coal that year was perhaps 75,000 tons. In 1903 the output was 3,677,909 tons. The plants recently erected handle large tonnages at low cost, and make a high recovery.

The value of a culm bank is something not readily determined. Its age, the quality of the coal, and the cost of separation are important factors. The age of the bank determines the probable percentage of merchantable coal that can be recovered.

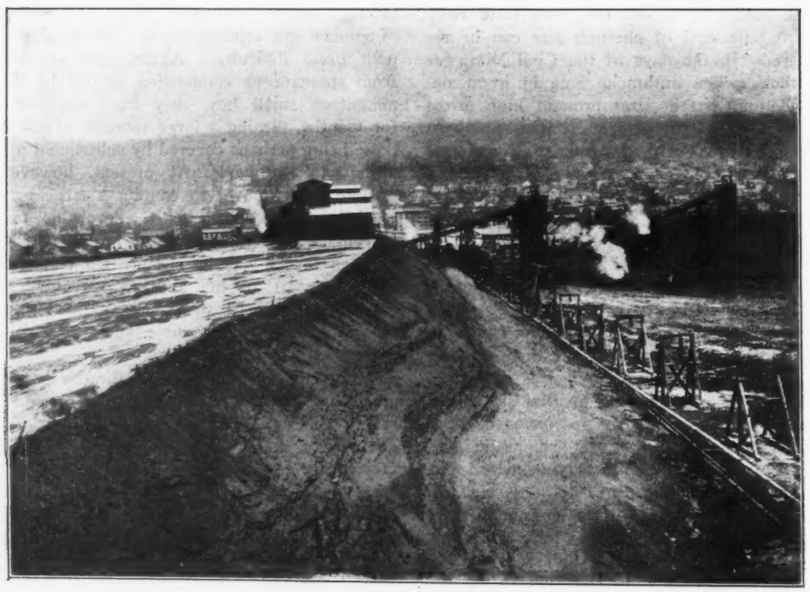
Other factors help settle the value. If in operating the colliery that contributes to the bank, boiler ashes were dumped with the mine refuse, that part of the bank may be greatly lowered in value, because the bits of clinker are separated from the coal only with great difficulty. Again, fires starting from spontaneous combustion, or set by the ubiquitous small boy, may have smoldered for months, turning a large tonnage to ashes, these being perhaps covered by subsequent additions to the bank. At present, however, a culm bank known to contain a large proportion of good coal, with a probably fair percentage of chestnut size or larger, and so situated that it can be cheaply worked, is a valuable asset in the anthracite region. It may be worked by the company owning it, or on a royalty basis by some independent concern.

Anthracite washeries, like anthracite breakers, differ considerably in plan and in equipment, but are alike in requiring a large amount of water. The washeries recently erected are compact structures with little free space as compared with the general run of breakers. This is due to the breakers handling run-of-mine coal, preparing at least part dry, and making a greater number of sizes. In fact, a washery is really a part of a breaker, modified to meet special conditions. The two plants briefly described below are both in the Wyoming Valley, and are fair examples of present practice there, though neither contain jigs, in this respect differing from many washeries.

The first, employing 25 men and having a nominal capacity of 400 tons of washed coal a day, is working an old culm pile of irregular shape. The culm is loaded from the bank into dump cars, holding 3 cu. yd., by an Oswego beam-shovel having a 1.5 cu. yd. dipper. A small locomotive hauls these cars over a 42-in. gauge railway to the washery, where they are dumped on a bar screen over a chute leading to the boot of a bucket elevator. The bars, of 2-in. iron, are 6 ft. long, have a 12-in. pitch, and are set 2½ in. apart at the upper end and 3 in. at the lower. A laborer examines all lumps that pass over, knocking off and throwing into a chute leading to the main rolls any pieces of coal. Everything that passes through the screen goes to the elevator. This has 84 sheet-steel hopper buckets, 23 in. long, 20 in. wide across the top, and 13½ in. deep. The sprockets are 80½ ft. apart, center to center; the driving sprocket makes 12 revolutions a minute and the chain one revolution. The buckets and chain are of the Susquehanna Coal Company type, and were made by the Exeter Machine Works, of Pittston, Pa.

The material elevated is dumped above the upper floor of the washery on a chute leading to the screens. These screens are all shakers, revolving screens having been found less suited for washery practice, as they require more room and, when used for the smallest sizes, clog badly. The topmost screen has two decks; the top deck, of perforated metal, is 5 ft. by 14 ft., with 1⅝-in. round mesh. What comes off the end is carried by a chute to the rock pocket, except pieces of coal which, picked out by hand, are sent to the main rolls and broken down to chestnut size or smaller.

Two boys do most of the picking. The lower deck of the screen, with 1 5-16-in. round mesh, is a little shorter than the upper. What comes off the end of this deck is chestnut size, and goes to a Pardee spiral picker, which takes out the slate that passes to the rock pocket. A Pardee spiral can make a three-



A SETTLING POND.

part separation, but in this case the bone is allowed to go with the rock. The coal pockets are so arranged that if the chestnut size contains too much slate and bone it can be drawn out, elevated and run over the picker again.

The material passing through the screen goes to another double-deck shaker, 6 ft. wide and 18 ft. long. The upper deck has 5/8-in. round perforations, and what passes over is pea size. This goes to another Pardee spiral that separates the coal from the slate and bone. The lower deck of the screen has round 3/8-in. holes. What comes off the end of this is No. 1 buckwheat, and goes direct to the pocket without picking.

The material falling through the lower deck is taken by a single-deck shaker, 7 by 20 ft., with 5-16-in. round holes. What passes over is No. 2 buckwheat, or rice, coal, and goes to the loading pocket. What drops through is received by another single-deck screen, 7 by 20 ft., with 3-32-in. round openings. The coal passing over is No. 3 buckwheat, or barley size. What falls through is caught in a slush-box and, having no present value, is either run down a launder to the settling dam, or flushed through a bore-hole to fill old mine workings. Though of moderate size, this is what is known as a two-side breaker, the material elevated being divided into two streams, each treated in the same manner, so that the screens and pickers mentioned are installed in duplicate. The screens are suspended by oak boards, 10 in. wide and 1 in. thick, and special provisions have been made to balance the thrust and reduce vibration, the eccentric shaft being long enough to actuate both series of screens.

The consumption of water is, of course, great. Above the upper floor of the washery is a tank holding 5,000 gal. The material falling from the elevator buckets is washed by a 2-in. stream into the head chute. Over the top shaker of each double-deck screen are wooden water-boxes with perforated bottoms, from which a heavy spray acts and washes the coal on the two decks. One water-box serves both the two single-deck screens, making three boxes for each side of the breaker. By these boxes the water is spread over the whole screen surface, keeping each piece of coal free from any adhering impurities. The tank is supplied by a Knowles pump, having a capacity of 800 gal. a minute, that draws from a well connected with the river.

The power equipment consists of two Manning upright 125-h.p. boilers. The fuel used is mostly No. 3 buckwheat, and the draft is forced by a McClave steam-jet blower. The engine is a 13 by 18-in. Atlas.

(To be continued.)

CASTING SPOUTS AND TUYERE-BOXES.

By Hiram W. Hixon.

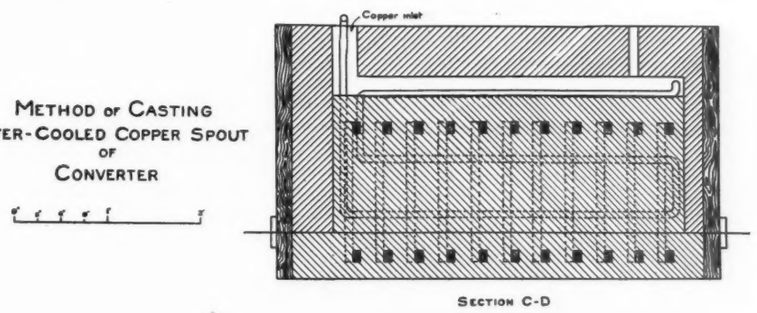
I send herewith drawings of methods of casting spouts for copper blast-furnaces, and tuyere-boxes for copper converters, of converter copper. These articles were made at the Teziutlan smelter and are in daily use; it has been shown that they fully meet all requirements and are much cheaper than the same article as produced by manufacturers. The spout and trap for the blast-furnace can be made deep enough to suit any pressure of blast that may be used on the furnace. The spout as shown in the drawing is suitable for the pressure of 3 to 3.5 in. mercury or less. The height of the trap in the spout can be varied by inclining the trap at a greater angle. We have had no failures in casting these spouts, having made good castings each time it was tried. So far we have cast four spouts, and three of them are still in use or in reserve. The first one was cast too shallow for the blast-pressure, and after being used for some time another one was cast of deeper cross-section, and the first one broken up and returned to the converters as scrap. This spout with removable trap has the advantage that if the furnace is to be shut down, the trap can be removed while the blast is on and all the molten material blown out into the settlers, avoiding the necessity for tapping the furnace on the side and having a lot of explosions from contact with water.

I also cast a number of tap-jackets for the settlers in the same manner, curving a pipe around the tap-hole, casting a solid block of copper 3 to 4 in. thick and 15 by 24 in. in dimension, then boring out the tap-hole the required size.

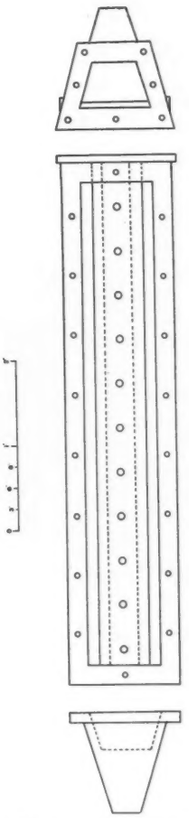
The tuyere-boxes were cast for the converters and the tuyere holes afterward drilled through, the copper tuyere-box being fastened to the shell of the converter in the manner shown. Two of these tuyere-boxes have been in use and have proved satisfactory, displacing tuyere-boxes originally supplied which had been broken by contact with hot metal. The copper tuyere-boxes are in every way as satisfactory as the original, and are not sub-

WORKING A CULM BANK.

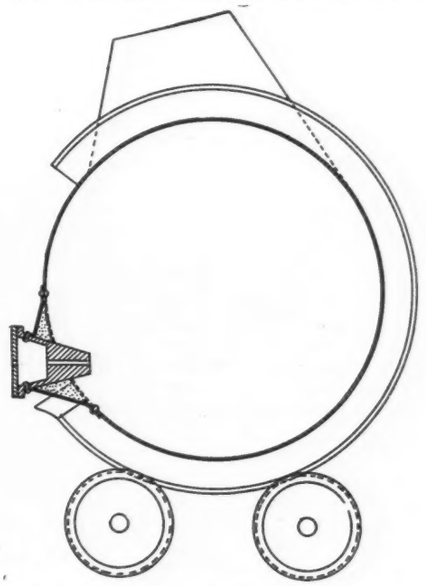
METHOD OF CASTING WATER-COOLED COPPER SPOUT OF CONVERTER



ject to breakage. It has been found that if a charge has been run on the bare copper after the lining is destroyed the copper tuyere-box will be melted as far back as the air-chamber.



One such accident occurred and it was repaired by turning the converter so that the tuyere-box was on top, putting clay on the inner side of the hole, taking off the outer cover

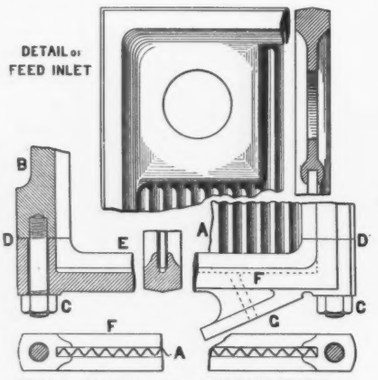


of the tuyere-box and pouring in enough copper from another converter, by means of a ladle, to fill the burned out portion, after which the tuyere holes were again drilled. The converter has since been in operation continuously.

Many articles for repairs about the plant, such as pump-glands and cams for shaking screens, have been cast from converter copper and found to give satisfaction.

A NEW FILTER-PRESS PLATE.

A new type of filter-press plate has been patented by the Niles-Bement-Pond Company; instead of being made of cast iron in one piece, the plate consists of a panel *A* of corrugated steel, held loosely in a groove in a cast-iron frame *B*. This frame is of sufficient depth to give the required thickness of cake. In making



DETAILS of FRAMING SHOWING DRAINAGE GROOVE ETC.

the frames, special precautions are taken to insure uniform thickness and true joint faces. This is accomplished by casting the frame in one piece, drilling the holes for the studs *C, C'*, and then parting the frame only at *D, D'*. Only after this joint has been permanently made are the two joint faces of the frame planed.

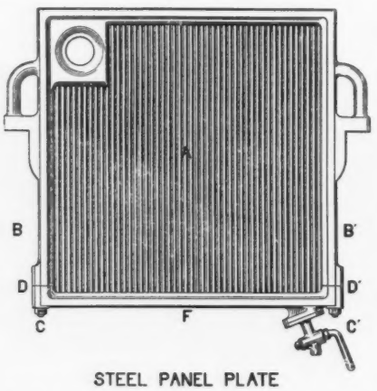
To carry away the clear liquor, a drainage groove *E* is formed in the bottom member *F* of the frame, which opens into an outlet port *G*, provided, as usual, with a nozzle or cock.

The advantages claimed for this method are the following: A much deeper groove can be employed with the steel panel than is possible with a cast-iron plate, without making the latter excessively thick. Consequently the area of free filter cloth is much larger, as is also the cross-section of groove behind it, the result being more rapid filtration and better drainage of the clear liquor. The latter is still further improved by the method of carrying off the filtrate. It will be noticed in the plan and cross-section of the plate that the grooves of the steel panel open directly and to their full cross-section into the drainage groove *E*. This outlet passage cannot be obstructed by the sagging of the filter cloth, as in a cast-iron plate, where it is formed on the surface of the plate.

One of the greatest advantages is the very considerable reduction in the weight of the plates, the saving amounting to about 50 lb. on the 24-in. square, and about 100 lb. on the 32-in. square plate. The price of the plates is correspondingly lower, while freight charges, labor in handling, and risk of breakage are all much reduced.

Panel plates are much more easily cleaned than cast-iron plates, and any scale formed on them may be removed by tapping. For the filtration of hot liquors, the steel panel plate is also much superior to cast plates. The latter often break in consequence of the central part of the plate expanding more rapidly than the tightly held rim. The steel panel is only loosely held in its frame, and is thus free to expand without causing any trouble. In case of damage to a plate by unequal pressure, such as is sometimes caused by the blocking of the feed channel to a chamber, only the steel panel is rendered useless. With cast-iron plates, which, just like the panel plates, cannot be made strong enough to resist pressure applied to one side only, a broken plate is entirely lost, the damage amounting to five to ten times the cost of a new corrugated panel.

The feed inlet in the illustration is shown in one corner, in a lug of the cast-iron framing, but it may also be placed in the center, as in cast-iron plates. These steel panel plates are



STEEL PANEL PLATE

made in all sizes from 18 to 36 in. square, and in all usual types—non-washing and washing, with open or closed deliveries.

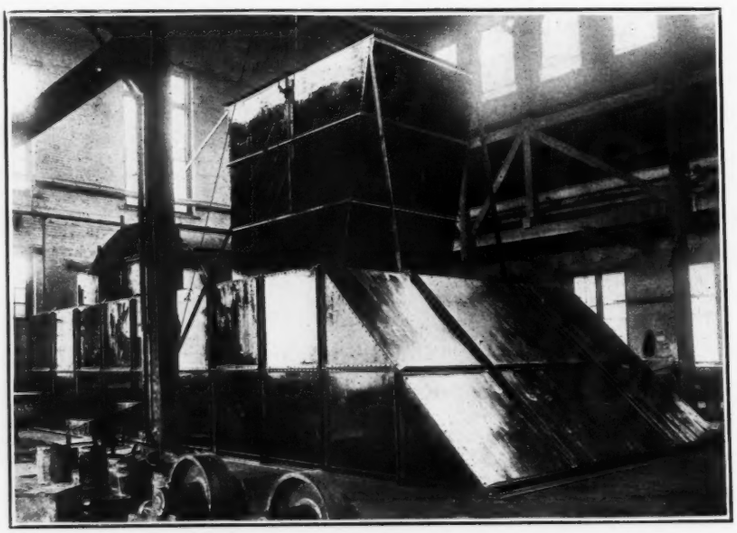
A COLLIERY FAN CASING.

The accompanying illustration shows a steel casing made for a Guibal fan for ventilating a colliery, made by the Vulcan Iron Works, of Wilkes-Barre, Pa. This casing is for an exhaust fan, and the tapered end is placed directly over the top of the shaft. The fan takes the air through the side passages and discharges it through the chimney. The side indicates the large capacity of the apparatus.

The fan for which this casing was made is of the Guibal type. It is 35 ft. diameter, carrying 10 vanes, each 11 ft. 9 in. wide. The diameter of the shaft is 12 in. The fan is driven by a horizontal engine, coupled directly to the shaft, the cylinders being 22 by 36 in. The usual periphery speed is 5,000 ft. per minute. This requires, for a 35-ft. span, 48 revolutions per minute. The air capacity is 7,500 cu. ft. per revolution, or 360,000 cu. ft. per minute. The frame carrying the vanes is of wrought iron, strongly braced.

The Vulcan Works make these fans in a number of sizes, the largest being that described above. The smallest generally made is 10 ft. diam., with six vanes 3 ft. 4 in. wide. At 168 revolutions per minute, driven by a horizontal engine with cylinders 8 by 10 in., this fan will deliver 35,000 cu. ft. of air per minute.

The fan casings are made of wood or of steel plate, as required. The casing shown herewith is of steel.


CASING FOR GUIBAL SUCTION FAN.

EMMONSITE.—Hillebrand announces a new occurrence of this mineral in the W. P. H. Mine at Cripple Creek, Colo. It is essentially a ferric tellurite.

ARTIFICIAL EMERALDS.—Regarding the reported production of artificial emeralds, Professor Verneuil, who has succeeded in making artificial rubies, writes to the *L'Echo des Mines et de la Metallurgie* as follows: "My work on the reproduction of the emerald has resulted in the negative. . . . This has shown me that it is not possible to obtain the emerald of proper composition, color and hardness by fusion."

SUNLIGHT IN CYANIDATION.—It was ascertained several years ago, by Bettel and Feldtmann, that sunlight stimulates the formation of potassium-thiocyanate in solution. More recently Caldecott and Johnson have shown that gold foil is dissolved by cyanide at a 43 per cent better rate in sunlight than in the dark. Now Berthelot has shown that the absorption of oxygen by the cyanide solution, with the presumably attendant liberation of nascent cyanogen, is quickened by sunlight. Though the McArthur-Forrest inventors did not seem to know it, yet practice has proven that the solution of gold to the form of the potassium-aurocyanide, K Au $(CN)_2$, is a reduction process. This consequently requires the addition of oxygen, or the equivalent, to balance the conditions. But the quick and obedient absorption of oxygen has not yet been accomplished. If sunlight is to be the stimulant, well and good; but it may mean a radical modification of the construction of the solution tanks. Here is another call for the inventor who can harness sunshine and oxygen.

THE SARGENT COMPLETE-EXPANSION GAS ENGINE.

The Sargent engine, it is claimed, was not only the first successful double-acting tandem gas engine, but the first and only one to expand the burning charge to practically atmospheric pressure, to vary the point of cut-off of the admission inlet with the load, and to advance the time of ignition as the mixture gets weaker and the inflammation slower. The advantages thus secured over the ordinary gas engine are added efficiency, increased regularity in speed, and smooth running under early cut-offs.

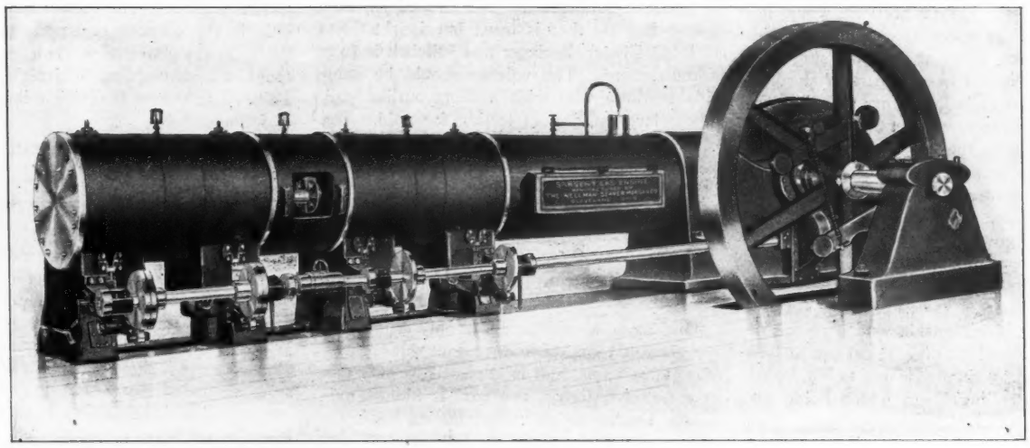


FIG. 1. THE SARGENT COMPLETE-EXPANSION GAS ENGINE.

The general design, as shown in Fig. 1, is such that all the strains come in a straight line, yet the free expansion of the cylinders and rods is provided for. The sub-base, the top of which comes flush with the floor-line, extends from end to end of the engine, thereby giving a flat planed surface upon which the engine is easily erected and aligned. The sub-base and main frame are bolted to the foundation, and the crosshead guide, cylinders and distance-head, which fasten to the main frame, can come and go as the temperature varies, sliding on the hollow supports rising from the sub-base, which not only maintain the cylinders in line, but convey the gas and air from the hollow divided sub-base to the explosion chambers, thus doing away with the pipes. The crank, connecting-rod, crosshead and guides, while inclosed to keep dirt out and oil in, are accessible even while the engine is in operation.

In the ordinary gas engine, the piston at full load draws in a cylinder full of combustible mixture, which, after compression and ignition, is expanded to the original volume and released at a pressure of 40 to 50 lb. absolute, and a temperature of from 1,500° to 1,800° F. In the Sargent engine the admission of gas and air at full load is cut off from five-eighths to three-quarters of the admission stroke, depending on the fuel used, which, after compression and ignition, is expanded to the cylinder volume and is released a little above atmospheric pressure with a corresponding temperature of about 400° F. The point of cut-off, while constant for the full and most economical load of the engine, is made earlier by the governor, as the load gets lighter, or later as the loads gets heavier, giving unusual flexibility.

A side shaft driven by the crank-shaft and governor through a pair of worm gears running in oil, carrying two cams for each explosion chamber, one for the igniter and one to operate the valve, comprises all the moving mechanism except the valves and lever, as shown in Fig. 1, the other side of the engine being perfectly plain. Fig. 2 shows a section through the valves of one of the explosion chambers. By removing six nuts, valve bushing and valves can be removed from the cylinder for re-grinding or inspection.

Gas is piped to the chamber *A* in the sub-base and air to the chamber *B*, which pass through the cylinder supports to the chambers *A'* and *B'*, ready to pass into the mixing chamber when the cam depression *MN* passes the roller and the ports *F* in the piston valve register with the ports *E* and *D* in the bushing. When the piston valve goes down to this position, the confined air in the piston valve dashpot forces open the poppet valve, thus giving free admission to the charge. When the point *N* of the cam reaches the roller, it is forced down, while the other end of the lever goes up, carrying the piston valve which cuts off the admission. The poppet-valve seats and both valves remain in normal position during compression, ignition, and expansion, or until the point *L* on the cam pushes the roller down and the piston up, which opens the poppet and the exhaust gases pass out through the ports *K* and the elbow *W* to the exhaust pipe under the floor.

The poppet valve seals the opening in the combustion chamber during compression and inflammation, and the piston valve, holding against no pressure, works loosely in its bushing, cutting off the admission and guiding the exhaust. As the poppet valve controls both the inlet and outlet gases, both the valve and seat keep cool and seldom need to be ground. The mechanism is simple and, as the roller is always bearing on the cam, the valve motion is practically noiseless. By revolving the piston valve by the index wheel, the blind port *S* varies the mixture to suit the gas, whether it has 100 or 1,000 British thermal units per cubic foot.

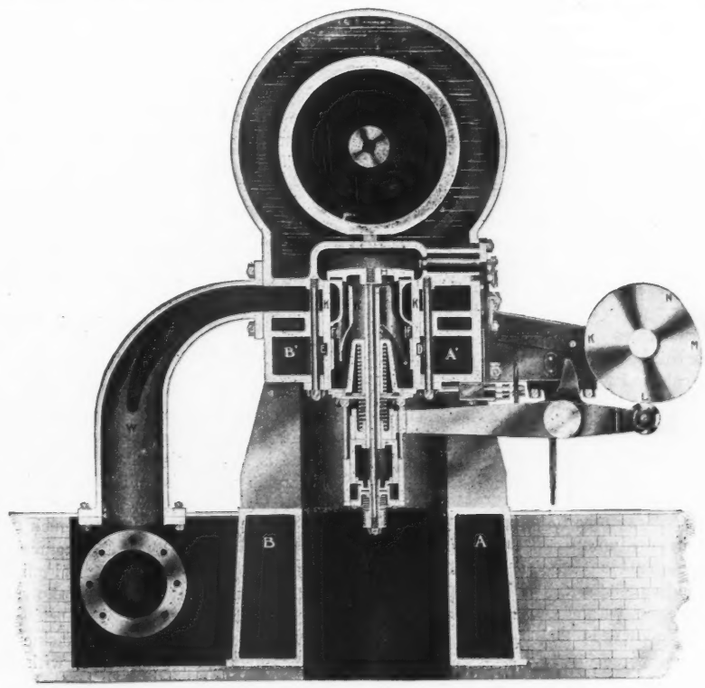


FIG. 2. VALVE SECTION.

The speed of the Sargent engine is controlled

by the Rites inertia governor in the fly-wheel, which advances the valve shaft in time ahead of the crank-shaft as the speed increases, thus diminishing the mean effective pressure with the load. As the load gets lighter, the cut-off becomes earlier, taking less of a constant mixture of gas and air into the cylinder, but as the burnt products in the clearance do not decrease, the mixture gets weaker and slower burning. If the ignition were at the same point as at full load, the highest pressure would not be attained till the piston approached the middle of the stroke, where the cooling surface is so increased that the greater part of the heat goes into the water-jacket rather than into the work. In the Sargent engine, the time of ignition advances with the cut-off, getting earlier as the mixture gets weaker, thus maintaining the highest pressure at the beginning of the stroke, irrespective of the load.

While the governor controls the speed through all ranges of load, the gas engine, like the steam engine, is not economical with very light loads. Where a variation in the turning moment is not objectionable, one or more of the explosion chambers may be cut out at will by the engineer, by simply raising to horizontal position a controlling lever, which holds the exhaust open.

If at full load the Sargent engine is cutting off at three-quarters stroke, an overload may be taken care of by a later cut, though at a decrease of efficiency.

Two electric igniters are placed in each explosion chamber in such a position that they are surrounded with a pure mixture at the time of ignition. Either will fire the charge, and should either become short-circuited, the engineer is immediately advised. The engine is started by compressed air. The pressure of the air when turned on at one cylinder puts the starting mechanism into operation and at the same time puts the cylinder out of service as a gas engine. When the engine is up to speed, turning off the air puts the gas engine into commission without changing a valve, cam, or lever.

CEMENT.—By the German portland-cement manufacturers, it is defined as a hydraulic cementing material; of specific gravity not below 3.1 when calcined, and containing not less than 1.7 parts of lime to one part of the collective oxides of silicon-aluminum-iron. The ingredients must be intimately mixed; must be calcined to not less than the clinkering temperature; and finally must be reduced to the fineness of flour.

GERMAN IRON PRODUCTION.—The output of the German blast furnaces in October was 868,523 tons of pig iron, the largest reported in any month this year, and 34,945 tons more than in September. For the ten months ending October 31, the total production is reported by the German Iron & Steel Union, as follows, in metric tons:

	1903.	1904.	Changes
Foundry iron	1,501,970	1,532,919	I. 30,942
Forge iron	716,874	687,742	D. 29,132
Steel pig	601,397	515,606	D. 85,791
Bessemer pig	363,544	337,607	D. 25,937
Thomas pig	5,210,271	5,325,618	I. 115,347
Totals	8,394,056	8,399,492	I. 5,436

The total increase, as shown, was very small. There was an increase in Thomas, or basic, pig, and foundry iron; but a decrease in all other descriptions. Steel pig includes ferro-manganese, ferro-silicon, spiegeleisen, and similar alloys.

BOOKS REVIEWED.

Gold Assaying. A Practical Hand-book. By H. Joshua Phillips. New York; the D. Van Nostrand Company. London; Crosby Lockwood & Son. Pages, 152; illustrated. Price, $2.50.

This little book is devoted exclusively to the assaying of gold. The author states that he believes such a work to be warranted, both in point of condensation and also of expense. There is little that is new; but indebtedness to Rose, Eissler, Beringer and Mitchell is fully acknowledged. The volume should be valuable to those who wish a short outline only of the large subject of testing for gold. The text is accompanied by tables, the most valuable of which are those bearing on money exchange.

Fourth Annual Report of the Inspector of Coal Mines of the State of Montana. 1904. Howard F. Welsh, Inspector. Helena, Montana; State Printer. Pages, 148; illustrated.

This State, a coal producer only within the last sixteen years, gave an output during 1903 of 1,514,438 tons, and is expected to give this year 1,472,204 tons. The coal is almost uniformly lignitic in character, having an average composition about as follows: Water, 6.9; volatile, 36.7; fixed carbon, 46.3; ash ranging from 5.1 to 19; fuel ratio, 1.27. In three localities, one in Cascade, and two in Park county, good coking coal is produced, and at Horr, a semi-anthracite (fuel ratio, 4.04) is being mined.

Mine equipment throughout the State is perfectly up to date; 87 cutting machines are in use, and large and expensive plants have been installed at Red Lodge, Bridger, Stockett, Belt, Chestnut, Aldridge and Electric. Much space in the present report is given to excerpts from the coal-mining laws of various States besides those of Montana, and to a list of fatalities, of which there were nine in 1904 out of a total of 2,214 men employed. A couple of miners' grievances also come in for extended discussion.

Grundzüge der Kristallographie. By C. M. Viola. Leipzig, Germany; Wilhelm Engelmann. Pages, 390; illustrated. Price (in New York), $4.25.

There are several interesting features in this new manual of crystallography. In the first place it is penned by a professor of an Italian institution, the University of Rome; this is another testimony to the mental activity of the new Italy. Secondly, the book is the product of, and is inspired by, that marvelous German scholarship which is still the schoolmaster of the world. Thirdly, the volume is evidence that crystallography is very much alive—in fact, that it is quite likely to become some day a valuable accessory of practical mining and metallurgy. Those who have followed Groth and Liebisch and Voigt, in their scholarly development of the modern doctrine of symmetry, will be eager to go on with the new phase of crystallography—'harmony,' as it is called—which is only an aspect of symmetry considered from the standpoint of the growths and deformations of crystals. This volume by Viola, founded on Teutonic thoroughness, and conceived and illuminated in Latin imagination and vivacity, will be welcomed by all who love minerals and their forms, and by all who would use them practically. Evidently we are approaching the period when crystallography will show herself to be the true molecular physics and chemistry of solids. The book of Professor Viola commends itself as another point scored in the history of crystals.

Geological Survey of Georgia. Preliminary Report on the Coal Deposits of Georgia. By S. N. McCallie. Atlanta, Ga.; printed for the Survey. Pages, 120; with maps and illustrations.

The Carboniferous rocks of Georgia occur only in the extreme northwestern part of the State, in the counties of Dade, Walker, Chattooga, Floyd, Gordon, Whitfield, Catoosa and Polk. The system is divisible into five groups, as follows:

Coal Measures.	Walden's Ridge sandstone	930 ft.
	Lookout sandstone	350 "
Lower Carboniferous.	Bangor limestone	600 "
	Floyd shale	1,500 "
	Fort Payne chert	150 "

The Lookout formation consists in its upper part of sandstones, shales and conglomerates, with from two to five coal seams. The lower part of the formation is mostly shale. The Walden formation consists of sandstone, conglomerate and shale, including from two to seven seams of coal.

The coal beds occur only in the Walden and Lookout sandstones, and are confined to two areas, covering Sand mountain and Lookout mountain respectively, in the counties of Walker, Chattooga and Dade.

The most important mines of the district are the Durham mines, located on Lookout mountain about 12 miles southeast of Chattanooga. The Durham coal-bed in places attains a thickness of 7 ft., but its average is not over 38 in. The amount of workable coal still remaining is very close to 1,000 acres. The Durham coal is high in fixed carbon, low in ash and sulphur, and makes excellent coke.

Important beds, most of which are not at present worked, occur near Cole City, in Dade county. Here three workable seams occur—the Castle Rock or Raccoon, the Dade, and the Rattlesnake, all occurring in the Lookout formation.

Mr. McCallie describes in detail the various outcrops of coal elsewhere in the State, and gives data concerning their thickness, composition, etc. He also discusses the correlation of these Georgia coal-beds with the better known sections shown at the Ætna mines in Tennessee.

The maps accompanying the report include a large colored geological map of northwestern Georgia, a map showing the areas within which coal may be found, and a third showing the relation of the Georgia coalfields to those of Tennessee and Alabama. Smaller detailed maps are given which show the relations at the various coal mining districts noted in the text.

A final chapter, by Prof. W. H. Emerson, gives the results of chemical and calorimetric tests of a number of Georgia coals. The following summary gives the principal results:

	1	2	3	4	5
Carbon	85.75	86.97	79.41	85.07	84.32
Hydrogen	4.03	4.44	4.60	4.48	..72
Water	0.88	1.06	0.93	0.77	1.21
Sulphur	0.79	0.62	0.88	0.88	0.78
Nitrogen	1.44	1.25	1.39	1.50	1.66
Ash	3.17	2.00	9.05	3.42	4.20
Heating value in calories: calculated	8366	8351	7821	8234	8292
Heating value in calories: calorimeter	8415	8409	7763	8290	8211

Of these analyses, No. 1 is lump coal from the Durham mine in Walker county; No. 2

and 3 are from the Carson property in Walker county, No. 2 coming from a point 120 ft. and No. 3 from a point 180 ft. below the Durham bed; No. 4 is washed coal from the Durham mine; No. 5 is unwashed coal from the mine of the Lookout Coal & Coke Company in Walker county. As will be seen, the coals tested fall into a fairly well defined group in the lower part of the semi-bituminous class.

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of this JOURNAL.

United States Geological Survey. Production of Coal in 1903. By Edward W. Parker. Washington; Government Printing Office. Pages, 192.

Separat-abdruck aus Tschermak's Mineralogischen und Petrographischen Mitteilungen. By R. Beck. Vienna, Austria; Alfred Hölder. Pages, 24; illustrated.

Ueber die Erzlager der Umgebung von Schwarzenberg im Erzgebirge. II Teil. By R. Beck. Freiberg, Germany; Ernst Mauckisch. Pamphlet, 40 pages; illustrated.

Facing and Finishing Exposed Concrete Surfaces from Reinforced Concrete. By A. W. Buel and C. S. Hill. New York; *Engineering News* Publishing Company. Pages, 20.

Rhode Island. Seventeenth Annual Report of the Commissioner of Industrial Statistics, 1904. Henry E. Tiepke, Commissioner. Providence, R. I.; State Printers. Pages, 224; illustrated.

The Electric Furnace. By Henri Moissan. Translated from the French by A. T. de Mouilpied. London; Edward Arnold. New York; Longmans, Green & Company. Pages, 308; illustrated. Price, $2.75.

Ordinary Foundations, Including the Copper Dam Process for Piers. Second Edition. By Charles Evan Fowler. New York; John Wiley & Sons. London: Chapman & Hall, Ltd. Pages, 332; illustrated. Price, $3.50.

Report of Committee on Standard Specifications for Cement. George F. Swain, Chairman; Richard L. Humphrey, Secretary. Philadelphia; the American Society for Testing Materials. Pages, 18; illustrated.

Utilization of Exhaust Steam in Connection with Low-Pressure Steam Turbines. By Leonce Better. Chicago; Reprinted from the *Journal* of the Western Society of Engineers. Pamphlet, 36 pages; with diagrams.

Department of the Interior. Bureau of Government Laboratories, No. 17. New, or Noteworthy Philippine Plants. II. By Elmer D. Merrill. Pages, 48; illustrated. *No. 18. Part I. Amebas. Their Cultivation and Etiological Significance.* By W. E. Musgrave and Moses T. Clegg. Pages, 100; illustrated. *Part II. Treatment of Intestinal Amebiasis.* By W. E. Musgrave. Pages, 28. Manila, Philippine Islands. Bureau of Public Printing.

Probably the first electric smelting furnace was that of Pichou, a description of which was published in 1853. He proposed feeding finely pulverized ore so that it should drop between the points of carbons, thus being fused in the arc before falling on a hearth. The method was, of course, impracticable.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
Letters should be addressed to the Editor.
We do not hold ourselves responsible for the opinions expressed by correspondents.

Oil Concentration of Bismuth Ores.

Sir—On page 753 of your issue of November 10 there is an interesting note regarding 'The Balmoral Cobalt Deposits.' Samples of this ore were submitted to us by Mr. Dorffel for test by the Elmore oil concentration process. The mineral consisted of sulphides and arsenides of cobalt, together with considerable gold values. We understood from Mr. Dorffel that the ore could not be successfully concentrated by usual methods, because of the disastrous slime and float losses. Our tests showed the ore to be particularly well suited to concentration by means of oil. The concentrates produced were of high grade, and the extraction both of cobalt and gold left nothing to be desired.

We think this information may be of importance to some of your readers in view of recent discoveries of somewhat similar ores in Canada.

THE ORE CONCENTRATION SYNDICATE, LTD.,
A. STANLEY ELMORE.

London, Nov. 30, 1904.

An Explanation.

Sir—Having received a number of inquiries from persons who have been approached by selling agents of the Jessie Mines Company, of Prescott, Ariz., representing that I was an officer of the company, I wish to state through your columns that I am not, in any way, interested in or connected with this company, and that the use of my name by them is not only without authority from me, but contrary to formal notice given them by me not to use it.

When this company was being organized by Mr. John S. Jones, I consented to join them, and attended two meetings of the board of directors, which were held to ratify the methods Mr. Jones purposed using, and to officially launch the company on the market. At the second meeting my resignation was tendered to Mr. Jones, the president, and accepted by him.

This action on my part was taken because I did not approve of his methods, and, in consequence, wanted nothing whatever to do with the company.

W. M. CLAYPOOL.

Prescott, Ariz., Dec. 10, 1904.

CHIMNEY AND MECHANICAL DRAFT.

A chimney with natural draft will have a draft dependent upon its height, the power of which will not vary, except upon the rise or fall of the internal temperature. It has therefore no sucking power; in fact, the term suction in this connection is a fallacy. The chimney acts because the external air is heavier than the internal, and thus presses into the chimney by the only available opening, that at the bottom, the furnace front. The pressure or intensity of the draft fixes the amount of fuel it is possible to burn on a given area of grate. It therefore becomes necessary, when it is desired to increase the steaming capacity of a boiler by increasing its coal consumption, to increase the intensity of the draft, and the only way is to increase the temperature of the gases passing up it, or to increase the height of the chimney. The first method, of course, is an uneconomical arrangement; the second is expensive and unusual. A chimney stack 150 ft. high will burn from 15 to 20 lb. of coal per square foot of grate area per hour under normal conditions, but in wet or foggy weather it will be much less than this, as the wet air is lighter than the dry, and thus produces less pressure at the furnace; the weight of water vapor is about half that of air. A fair average of temperature in the furnace is 2,400° F. and that of the escaping gases at the chimney, without economizers, 600° F. This means that much of the total heat generated is sent up the chimney to waste. Thus, on a large plant, too much heat is going up the chimney per hour, and the coal bill necessary to sustain this will come to a big figure in the year.

It has become a well-ascertained fact that it is cheaper and better in every way to provide the necessary supply of air for burning fuel in steam boilers by mechanical means, and to take all possible heat out of the hot gases after they have ceased to be in contact with the boiler itself before they are turned out into the atmosphere, than to do it in the older way by utilizing a portion of the heat generated to create the necessary supply of air. This is the primary reason for using a mechanical means of moving the air. The heat previously necessary to create the draft by means of a chimney may now be employed usefully in other directions.

EMERALDS IN COLOMBIA.—United States Consul-General A. G. Snyder, at Bogota, Colombia, reports that the Banco de Exportadores, a corporation which holds the largest interest in the syndicate now controlling the Muzo emarald mines, has made several large consignments to New York. It is expected that a market can be made in the United States for the entire output. The Chivor group of emerald mines has given good promises, and it is reported that the owners are going to try to raise in the United States the capital necessary for its operation. This group is also controlled by the syndicate which owns the Muzo. There are reports, however, that the government may take back the Muzo mines, and offer them for sale again.

ABSTRACTS OF OFFICIAL REPORTS.

Palmarejo & Mexican Gold Fields, Ltd.

The report covers the year ending June 30, 1904. The company's property comprises two mines near Zapoté, Chihuahua, and a milling plant equipped for amalgamating, concentrating, cyaniding and slime treatment. The company's offices are in London.

The main supply of ore carries 22.6 oz. silver and 0.1 oz. gold, and is obtained partly from newly developed orebodies, but in greater amounts from the walls of stopes abandoned by previous owners of the Palmarejo, 12 miles distant from the mill, and from old dumps of the Rosario and Tucson.

During the year, the mill was running 287 days and crushed 37,094 tons of ore. The recovery in the various treatments may be shown thus, in Mexican currency:

	Gold.	Silver.
Battery	$150,794	$1,060,774
Concentrate	27,575	187,518
Cyanide	85,360	335,429
Slime	34,072	210,150
Total	$297,801	$1,793,871

The profit and loss account, expressed in sterling, follows:

By sale of products	£76,947
Increase in stock of ore	161
Miscellaneous	2,122
Total receipts	£79,230
Mining and milling expenses	63,206
Depreciation	10,020
Royalty and insurance	545
London office	2,278
Interest on bonds	3,160
Reserve fund	3,000
Total expenses	£82,209
Deficit for the year	2,979
Credit balance brought forward	9,309
Balance for interest and dividend	£6,330

The company's assets amount to £744,868. Its liabilities include: Stock, £676,563; mortgage bonds outstanding, £52,460; accrued interest, £731; sundry, £3,783. Its reserve amounts to £5,000.

Although the report has an air of exactness and elaborateness, it is extremely obscure to any one not having already acquired a knowledge of the conditions. From the statement of the expense account it is impossible to estimate the cost of mining or milling.

St. Eugene Consolidated Mining Company, Ltd.

This company is one of the largest lead ore producers in British Columbia. The present report covers the year ending September 30, 1904, although actual mining has been carried on during only the last five months of that period, and the normal output of those months has been still further reduced by the unprecedented drought that visited that region during the summer.

In addition to the government bounty of 75c. per 100 lb. of lead content in ore smelted at home, the company, by a recent Order-in-Council, effected principally through the activity of its managing director, is entitled to a bonus of $10 per ton of lead contained in ore exported, subject only to the condition that home-smelted lead shall have prior claim upon the limited annual grant of $500,000. The payments of this export bonus will cease, however, at the close of the government's present fiscal year, and of the domestic bounty on June 30, 1908.

The company's paid-up capital is $3,500,000. The profit and loss account, which, creditably, is given in detail, may be condensed thus:

	Totals.	Product Per ton.
From sale of product	$257,463	$23.97
Lead bounties	91,661	8.53
Rents, etc	1,689	0.16
Total receipts	$350,813	$32.66
Mining	$124,183	$11.54
Milling	35,295	3.29
Management and sundry	21,376	2.00
Depreciation of plant	22,740	2.12
Capital stock discount	14,900	1.39
Total expenses	$218,494	$20.34
Net earnings for the year	$132,319	
Deficit, September 30, 1903	19,153	
Balance	$113,166	

An important addition to the concentrating equipment is a slime-saving plant to treat the tailing from all the vanners and Wilfley tables in the mill. It comprises six Frue vanners, two Wilfley tables, and two double-deck King classifiers, operated by a 40-h.p. engine. Drought has compelled the installation of an engine capable of running the mill unaided by water power, together with a 2,500-gal. pump to ensure sufficient boiler and mill water. An attempt to save zinc concentrate was abandoned when the unsuitability of the material for reduction purposes was discovered.

Five months' development, comprising 2,459 ft. of drift at an average cost of $11.74, and 147 ft. of raise averaging $13 per ft., has proved positively sufficient ore to yield 43,000 tons concentrate. The vein ranges in width from 3 to 10 ft., and much of the ore will give 50 per cent of finished product. Development has been particularly aimed to test the continuity of the ore; it has shown favorable evidence on all the doubtful points.

Ore broken in drifts and stopes during the five months amounted to 58,456 tons, at an average cost of $1.69. Of this, 50,456 tons was milled at a concentration ratio of 4.7 to 1. The sales may be itemized thus:

Sales.	Tons.	Value.	Bounty.
Trail and Nelson	6,393	$130,053	$62,128
Europe	4,346	127,410	29,533
Totals	10,739	$257,463	$91,661

Although the president remarks, "It must, however, be borne in mind that we are depending almost wholly upon the bonus for our profit," a glance at the profit and loss account shows an apparent net gain of $3.79 per ton of finished product, exclusive of government aid, and this while subjected to the long delays attendant upon an incomplete equipment.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc. Preference will be given to topics which seem to be of interest to others beside the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Blende and Chalcopyrite.—Is it possible to separate chalcopyrite from sphalerite, and is it done anywhere so that I can find literature on the subject?—S. C.

Answer.—Regarding the separation of sphalerite and chalcopyrite, it is being done by several of the electro-magnetic separators, and also by the unique Blake-and-Moucher electrostatic separator. Mr. Henry Wood (1734 Arapahoe St., Denver) can give you information regarding the former, and Mr. W. G. Swart (1936 Curtis St., Denver) regarding the latter.

Barytes, or Barite.—Will you tell me something about this mineral, its composition and uses? Also where the supply comes from?—B. S.

Answer.—The chief supply of barite, commercially known as barytes, $BaSo_4$, comes from four counties in Missouri, namely, Cole, Crawford, Miller and Washington; but Tennessee, North Carolina, Virginia and Kentucky contribute considerably. The mineral is used for the legitimate adulteration of white lead in places where the presence of sulphur gases would stain the pigment black, the white color of the barite being permanent. But the barite does not mix with oil so well as white lead, neither does it adhere so well to a surface. Barite paint makes an excellent covering for the interior ceilings of chemical laboratories.

Saltpeter.—What is the consumption, use and value of this mineral? I know of a large deposit.—D. C. O.

What is the difference between potassium nitrate (saltpeter) and nitrate of soda, and the market value of each?—D. O.

Answer.—So far India is the only producer of native saltpeter, containing 46.5 parts potassium and 53.5 parts nitric acid, while Chile and Peru jointly are the only countries where nitrate of soda, containing 36.47 parts soda and 63.53 parts nitric acid, is marketed. The consumption of saltpeter in this country is not far from 12,000,000 pounds per annum—about half the Indian production—principally in the manufacture of gunpowder and for preserving foods. Its market value at New York is now $3.90 per 100 pounds for the crude product, and $4@$4.50 for the refined. Nitrate of soda, sometimes called Chile saltpeter, is considerably more serviceable industrially than the Indian saltpeter, being used to the extent of 280,000 tons annually in the United States. Just now the principal consumers of nitrate of soda—manufacturers of blasting powder, artificial fertilizers, acids, glass, etc.—are paying $2.325 @$2.35 per 100 pounds for 95 per cent quality, and $2.35@$2.375 for refined, or 96 per cent. Approximately one-quarter of the production of nitrate of soda this year has been assigned to American consumers.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

RIGHT OF SURFACE SUPPORT.—In answer to several questions on this point, we reproduce herewith the following paragraphs from Lindley's 'American Law Relating to Mines and Mineral Lands,' second edition: "In every grant of mines there is an implied reservation of surface support. There is a ***prima facie*** inference at common law upon every grant of minerals or other subjacent strata, where the surface is retained by the grantor, that the grantor in granting them does so in a manner consistent with the retention by himself of his own right to support. In the absence of express words, showing clearly that he has waived or qualified his right, the presumption is, that what he retains is to be enjoyed by him ***modo et forma*** and with the natural support which it possessed before the grant.

"The owner of the surface of land from which the title to the minerals has been severed has, in the absence of a contrary agreement, an absolute right to have it supported as it was in its original state, and one mining under it is answerable for damages arising from failure to properly support it, or from negligence in conducting mining operations, or from both of these causes together.

"Of natural right the surface land is entitled to support from the strata below, and when one owning the whole fee grants the minerals, reserving the surface to himself, his grantee is entitled to so much of the minerals as he can get without injury to the superincumbent soil.

"A grant or reservation of all and every part of the 'mines and minerals in the land' in the strongest possible terms would not authorize the owner of the minerals to excavate without leaving proper support for the surface. By reasonable intendment the grantee of minerals or the grantor of the surface reserving the minerals could only be entitled to so much of the mines below as would be consistent with the proper enjoyment of the surface. This rule obtains without reference to the nature of the strata or the difficulty of substituting artificial for natural supports, or the comparative value of the surface and mineral.

"The mineral proprietor may substitute artificial supports in place of the ore removed, but being bound under the law to leave sufficient ribs or pillars to support the soil, he substitutes the artificial for the natural at his peril."

PATENTS RELATING TO MINING AND METALLURGY.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending December 6, 1904.

776,490. ELECTRODE.—Frank J. Briggs, Everett, Mass. In an electrode, carbons or anodes arranged in pairs, and provided with heads; a copper ribbon wound around and connecting the heads of the two carbons in each pair; a copper top adapted to be electrically connected; copper lugs extending down from said top between the heads of the carbons in each pair on one side of said ribbon; washers located on the opposite side of the ribbon, and screws or bolts extending through said washers and lugs, whereby the two parts of the ribbon may be drawn together and against the copper lugs.

776,508. PROCESS OF PURIFYING WATER.—Thomas E. Fulghum, Grand Junction, Col., assignor of one-half to Albert A. Miller, Grand Junction, Col. A process which consists in adding in suitable proportions a reagent consisting of a saturated solution of sodium bicarbonate, 5 lb.; sodium carbonate, 5 lb.; and sodium borate, 1 lb., agitating and aerating; after a time adding an oxidizer consisting of a solution of chloride of iron; agitating and aerating; and after settling removing the sludge.

776,523. PIPE-GRAB.—Fred J. Lukins, Aurora, Ill., assignor to the American Well Works, Aurora, Ill. A pipe-grab, comprising a spreader composed of a tapered head and a stem, a tube connected with said stem, a rod lying within said tube and moving longitudinally thereof, a plurality of rods connected with said first-mentioned rod and extending below said tube, and wedges carried by said rods and arranged to be operated by said spreader-head to grip the pipe to be removed.

776,531. MINE-CAR COUPLING.—Marshall G. Moore, Johnstown, Pa. A car-coupling comprising links and clevises or their equivalents, one or more of said members being twisted about the longitudinal axis thereof, whereby said coupling works freely into its slack position, thus forming a short hanging loop.

776,543. PROCESS OF MANUFACTURING AMMONIUM FORMATE.—Harry Pauling, Brandau, Austria-Hungary. A process for the manufacture of ammonium formate by synthesis, consisting in subjecting a mixture of gases containing hydrogen, nitrogen and monoxide of carbon together with steam to electric non-luminous discharges in the presence of porous contact-bodies.

776,613. ROCK-DRILLING MACHINE.—Leroy S. Pfouts, Canton, Ohio, assignor of one-half to Thomas F. Turner, Canton, Ohio. In a rock-drilling machine, the combination of a support, a turn-table carried by the support, a motor connected thereto and carried thereby, said support provided with upright members spaced from each other, a drill-frame pivotally connected at right angles to the pivotal connection of the motor turn-table, a sliding carriage and said drill-frame carrying operating mechanism, and the drill-operating mechanism driven from a motor-pinion having a common center with a pivotal connection of the drill-frame and motor-supporting turn-table.

776,647. CONCENTRATOR.—Frederick M. Dillon and Wylie G. Wilson, Denver, Col. A transversely inclined concentrating-table having a longitudinal vibration whose tendency is to cause the material to travel thereon from the head toward the tail of the table, the said table having longitudinal riffles arranged in groups of varying height, the highest group being located upon the upper portion of the transversely inclined surface, the lowest group being centrally located on said surface, and a third group on the lowest portion of the table.

776,706. METAL WELDING.—Heinrich Wachwitz, Hersbruck, near Nuremberg, Germany, assignor to the Wachwitz Patents Syndicate, Ltd., London, England. A process of coating a base metal with aluminum-bronze, which consists in placing a copper sheet previously plated with aluminum on the base metal with the aluminum next to the base metal, heating the combined metals to a point below that at which the base metal will oxidize, compressing the combined metals and again heating the same to a welding temperature whereby the aluminum and copper metals combine to form aluminum-bronze, and said bronze adjacent to the base metal is caused to unite therewith.

776,662. CONCENTRATOR.—Henry E. Horn, Denver, Col., assignor to the Brush Belt Concentrator Company, Denver, Col. A concentrator provided with an endless traveling belt, in combination with means for forming a transverse valley in the upper portion of the belt, comprising a number of transversely separated wheels whose peripheries engage the upper surface of the belt.

776,696. CASTING PLANT.—Clifton W. Sherman, Bellevue, Pa. In a casting plant, the combination, with an endless way, of a traveling carrier, a flask carried by said carrier, a mechanism for separating the casting and flask and replacing the flask on the carrier, a mechanism for removing said casting, said mechanisms located adjacent to and in line with the line of travel of said carrier and adjustable in said line of travel.

776,711. APPARATUS FOR RAISING WATER.—Robert A. Wilken, Hammond, Ind. The combination with a rotary piston and pump-casing of a discharge-pipe connected with the discharge end of said casing, a piston driving-shaft mounted coaxially in said discharge-pipe, a stationary supporting-bracket, and means whereby said discharge-pipe is connected to said bracket with capacity for angular adjustment relatively thereto.

776,744. ORE-CONCENTRATOR BELT.—John Kane, Passaic, N. J., assignor to the Manhattan Rubber Manufacturing Company. A belt for ore-concentrators having continuous side flanges of vulcanized rubber surmounted by integral transverse upwardly extending edge projections.

776,749. SUCKER-ROD GRAB.—Omar A. Mann, Oilcenter, Cal. A device comprising a hollow cylinder and a bifurcated clutch member hinged intermediate of the ends of the cylinder and arranged to bridge the opening therethrough.

776,835. CENTRIFUGAL PUMP.—Thomas R. Goth, San Francisco, Cal. A casing for a centrifugal pump having in elevation a curvilinear scroll-shaped body provided with a tangential discharge, and having in cross-section an inner periphery, which is flat at the top but changes gradually to circular form at the neck of the discharge-outlet.

776,847. BLOWER.—Joseph E. Kelley, Providence, R. I. In a blower, the combination of a nozzle having a closed end, a circular row of outlet-ducts extending forward to a cone-shaped valve-seat at an angle, a valve having ducts coinciding with the ducts in the nozzle, with the necessary appliances for moving the valves.

776,881. MINING-COLUMN.—Robert L. Ambrose, Tarrytown, N. Y., assignor to Rand Drill Company, New York, N. Y. The combination with a casing containing a longitudinal bore and an enlarged chamber of a threaded rod fitted to the longitudinal bore of said casing, a worm-wheel fitted to said chamber and engaging the upper and lower walls thereof, said worm-wheel internally screw-threaded and fitted to the said threaded rod, an operating-worm engaging the teeth of said worm-wheel and located in a recessed portion of said chamber, said chamber provided at another part with a side opening through which the worm-wheel and worm may be removed and replaced, a cap or closure for said opening and an operating-stem for said worm passing through from the recessed part of the chambered portion of the casing to the exterior thereof, the bearings therefor being in an integral portion of said casing.

776,907. PNEUMATIC LIQUID-ELEVATOR.—Eddie Hastain, Tishomingo, Ind. Ter. A pneumatic liquid-elevator, comprising a closed chamber having an inlet-valve and a central valved stand-pipe, a compressed-air valve and escape-valve opening into the top of said chamber, a main float surrounding the stand-pipe for operating the said compressed-air and escape valves, means for locking said float against rising and falling, and two supplementary floats also surrounding the stand-pipe and arranged one above and the other below the main float and acting to release the locking devices.

776,934. HYDRAULIC PRESS.—Carl Prött, Hagen, Germany, assignor of one-half to Alfred Colsman, Werdohol, Germany. In a hydraulic press, the combination of a press-block provided with a suitable bore for taking up the matrix, a bottom piece for carrying the matrix, a bayonet connection between the press-block and the bottom piece, a cover for the matrix, a bayonet connection between the cover and the press-block, and means for leading water into the matrix.

776,947. GAS-GENERATOR.—Paul Schmidt, Hanover, Germany. An apparatus for generating gas involving a generator, a joint downdraft-pipe communicating at its lower end with the generator at the zone of incandescence, channels for leading off the gases and vapors from the upper part of the generator into said downdraft-pipe, an ejector extending in said downdraft-pipe, a pipe communicating with the downdraft-pipes and with the generator for introducing gas in the downdraft-pipe from the most heated part of the generator, and a heating-jacket surrounding said downdraft-pipe.

776,952. PROCESS OF SECURING METAL COVERINGS UPON PIPES.—Richard V. Skowronek, Zwickau, Germany. Process of combining metal pipes melting at a high temperature with a lining of a metal melting at a lower temperature, which consists in forming a galvanoplastic deposit upon the surface to be covered, then applying against said surface the lining in the shape of a pipe, then placing the whole vertically in a mold adapted to inclose the lining metal fully and snugly and prevent it from leaking out when fused, then placing the mold vertically in an oven and heating it with the pipes sufficiently so as to fully melt the metal forming the lining, then allowing to cool and finally removing the mold.

776,959. COMPRESSED-AIR WATER-ELEVATOR.—George H. Stout, Denver, Col., assignor of one-half to Lucius A. Turner, Denver, Col. In a water-elevator, a submerged tank having an opening in its vertical wall, a plug adapted to close said tank-opening and having itself an inlet-opening, a valve-plate mounted to swing on said plug and adapted to close its opening, a lever including a cam pivotally mounted on said plug and adapted to close said swing-valve, a float for actuating said lever, means for fastening said plug from the outside, an outlet-opening in the tank and means for discharging the water from the tank.

776,980. ELEVATOR.—Emil Altmann, Helena, Mont An elevator having buckets with V-shaped bottoms, and sides, the top edges of the sides of each bucket being also V shaped to fit the bottom of the bucket next above it, the inner side of each V-shaped bucket having near its inner end eyes above and below its side edges the upper eyes of each bucket registering with the lower eyes of the bucket next above it, transversely extending pivots connecting the registering eyes of adjacent buckets with each other to form the buckets into a chain, said pivots projecting beyond the sides of the buckets, the relative position of said upper and lower pivot-points being such as to hold the buckets normally in a horizontal position, spaced sprocket wheels engaging the projecting ends of the pivots for carrying the bucket-chain around and for causing the buckets to assume a discharge position, and a receiving-chute having its mouth extending between the wheels and into which chute said buckets discharge.

777,013. LINING FOR SUBTERRANEAN PASSAGES.—Andres Fernandez, Pachuca, Mexico. A lining for subterranean passages, having base-sills upstanding side beams, cross-beams connecting the upper ends of the side beams, and transverse braces engaging opposing side beams.

777,020. DUMPING-CAR.—Joseph D. Hampton, Hazleton, Pa. A dumping-car having fixedly held sides and ends and a gate at one end, a movable bottom, means for automatically moving said bottom endwise to release said gate and carry the load therethrough to dump the same.

Week Ending December 13, 1904.

777,112. APPARATUS FOR CLEANSING THE GASES OF BLAST-FURNACES, GENERATORS, ETC.—Emil Kratochvil, Kraluv Dvur, Austria-Hungary. In a gas-cleansing apparatus the combination of a suitable casing, a horizontal rotatable shaft through said casing, a series of disks on said shaft, a plurality of pins on the faces of said disks, a water-supply pipe, branches leading from said pipe having nozzles directed toward said disks, a water-outlet for said casing and gas inlet and outlets in said casing.

777,115. CONCENTRATOR FOR SOLUTIONS.—John U. Lloyd, Norwood, Ohio. A concentrator for solutions consisting of a tank, a heating-coil therein, a cooling-coil beneath the heating-coil and means for admitting a heating medium to the heating-coil and a cooling medium to the cooling-coil simultaneously.

777,122. HOISTING AND CONVEYING APPARATUS.—Thomas S. Miller, South Orange, N. J. In combination, a hoist-actuator, a hoisting-rope having an elevated approximately horizontal run and a fall pendent from said run, a swinger-guide through which said fall operates and whereby the same is swung laterally from the vertical plane of said horizontal run.

777,125. EXPLOSIVE AND PROCESS OF MAKING SAME.—Armand Müller-Jacobs, New York, N. Y.

assignor to Catherine Müller-Jacobs, Brooklyn, N. Y., and Edward Weingartner, New York, N. Y. A method of manufacturing explosives which consists in printing upon the surface of a nitrocellulose with a solution of picrate of ammonia and chlorate of potassium.

777,145. MANUFACTURE OF ARTIFICIAL STONE.—Carl Rubitschung, Frankfort-on the-Main, Germany. A process of manufacturing molded artificial stone consisting in separately heating divided stony matter to a temperature above 180° C. and tar to a temperature equivalently below 150° C., feeding said stony material and tar together in their respectively heated states in definite proportions, mixing same, whereby the hotter stone imparts heat to the tar and continues the distillation thereof, feeding the product proportionately as it is formed to molds and compressing the same therein.

777,155. MACHINE FOR PRESSING CONCRETE BRICKS.—Henry S. Spears, Louisville, Ky. The combination of a bottomless mold of the size to hold a given number of bricks, with a plunger movable upward, having a cap fitting into the mold, slides one less in number than the bricks which the mold will hold, running in slots in the front wall of the mold, and a lid which can be clamped down upon the mold.

777,159. APPARATUS FOR RECOVERING PRECIOUS METALS.—Virginia Tunbridge, Newark, N. J., administratrix of John Tunbridge, deceased. An apparatus comprising a supply-chnanel having a backwardly inclined screen at its discharge end, a separator arranged to receive the material from said supply-channel, and provided with a series of sediment-collecting hoppers having sediment-discharges and separated by ridges which are progressively higher toward the outlet, a forwardly inclined screen located at the outlet of the separator and provided with means for holding soap, a filtering-tank connected with the outlet of the separator and provided with upright and depending partitions forming a series of upward and downward passages, filtering material located in the said downward passages, and a channel adapted to receive the overflow from the filter and to direct the said overflow against the sediment withdrawn from the separator.

777,171. CONVEYER.—Lawrence Abraham, New York, N. Y. The combination, with a traveling conveyer, of frames secured to said conveyers, a plurality of shelves movably secured to each of said frames, means for causing said shelves to discharge their contents at predetermined points, and a connection between two shelves carried by the same frame for causing one of said shelves to act as a stop to limit the movement of the other shelf at the moment of discharge.

777,173. COMPOSITION FOR PAVEMENTS.—Edward I. Allison, Saginaw, Mich. A composition consisting of shale, sand, stone-dust, pitch and tar.

777,176. SAND-CONCENTRATOR.—Erastus S. Bennett, New York, N. Y. In combination with a conduit for the material having a discharge-opening in its lower side, a deflector-projecting into the conduit to direct ore particles to the discharge-opening and the grating or guard associated with the said deflector, both the deflector and the said grating being adjustable and the said grating being arranged to guard the opening between the deflector and the bottom of the conduit.

777,178. APPARATUS FOR REMOVING SCALE FROM METAL RODS.—Ernst Boley. Cleveland, Ohio, assignor to American Steel & Wire Company, Chicago, Ill. In apparatus for removing scale from metal rods and analogous articles, the combination of means for projecting comminuted material, a series of rollers mounted in planes transverse to the plane in which such material is projected, and means for drawing such rods under tension over said rollers and repeatedly through the zone of action of said projected material.

777,204. EXCAVATING-MACHINE.—John Helm, St. Louis, Mo. A machine comprising a frame, dislodging mechanism pivotally mounted in said frame, and means to yieldingly hold said dislodging mechanism to its work.

777,227. CRUSHING-MACHINE.—Thomas L. Sturtevant, Quincy, and Thomas J. Sturtevant, Newton Center, Mass., assignors to Sturtevant Mill Company, Boston, Mass. In a rocking-jaw crushing-machine, the combination with a U-shaped machine-frame open at its rear end and having side parts provided with projections to form buttresses for toggles, of a fixed or normally stationary jaw mounted in said frame, a coöperating rocking jaw, a rocking-jaw frame also mounted in said machine-frame and carrying said rocking jaw, toggles interposed between the rear parts of said rocking-jaw frame and the said buttresses of said machine-frame, and means for operating said rocking-jaw frame.

777,233. AMALGAMATOR.—Elizabeth P. Wilkins, Baltimore, Md. The combination with a receptacle of a cylinder adapted to rotate therein, a stand-pipe rigidly engaged in and projecting below the bottom of said cylinder, a worm conveyer in said stand-pipe projecting below the bottom thereof, inwardly directed beaters on the bottom and sides of said receptacle and outwardly directed beaters on the bottom and sides of the cylinder arranged staggering therewith.

777,273. SEPARATION OF THE METALLIC CONSTITUENTS OF ORES FROM GANGUE.—Arthur E. Cattermole, London, England. A process of separating metalliferous matter from gangue which consists in mixing the pulp with an amount of oil equaling only a fraction of the metalliferous constituents, agitating the mass until the oil-coated metalliferous matter is agglomerated into granules, and subjecting the mixture to classification to remove the small non-coated particles from the granules.

777,274. CONCENTRATION OF MINERALS FROM ORES.—Arthur E. Cattermole, Henry L. Sulman, and Hugh F. Kirkpatrick-Picard, London, England. A process of concentrating ores which consists in mixing the ore-pulp with a soap solution and a mineral acid so as to liberate from the soap the organic acid which coats the desired mineral particles but not the gangue, agitating the mixture so as to agglomerate the coated mineral particles into granules and separating the granules from the non-coated gangue.

777,303. FASTENING FOR PICK-HANDLES, ETC.—Totten Poling, Menlo, Iowa. In a handle-fastening for picks, a pick having a dovetail cavity in its front edge or face, mating keepers fitted in the cavity and also fitted to receive a wooden handle, toggles placed in the cavity and in contact with the keepers, a wooden handle between the keepers and in contact with the toggles, and means for retaining the keepers in contact with the handle.

777,317. SHAKING ORE-SCREEN.—John A. Traylor, Denver, Col. In a shaking-screen, a supporting-frame having brackets attached thereto, a screen supported from said brackets by spring-controlled rods and toggle-links depending from said brackets, connecting-rods operatively arranged to reciprocate said links to impart a swinging vertical movement to said screen, an adjustable bumper device comprising an adjustable bumper-head and bumper-brackets arranged partially on said supporting frame and partly on said screen, adapted to give said screen a bump at the end of each of its upward vertical strokes, an eccentric-rod pivotally secured at one end to said screen and operatively mounted on a suitable power rotating shaft at its opposite end, a rock-shaft pivotally mounted in suitable bearings secured to said supporting-frame, rock-arms secured at one end of said rock-shaft and pivotally connected at their opposite ends to said connecting-rods, a spring-controlled reciprocating device operatively connected at one end to said power rotating shaft and connected at its opposite end to said rock-shaft for reciprocating said rock-arms, and adapted to permit variable movement between said screen and links and having said spring-controlled rods arranged and adapted to normally hold said screen under upward vertical tension and to resiliently impinge said screen against said bumper device.

777,338. METAL-CASTING PROCESS.—John H. Forbes, Cincinnati, Ohio, assignor of one-sixteenth to James N. Ramsey, Cincinnati, Ohio. A process for casting metal consisting in first magnetizing a portion of the mold, then applying to such magnetized parts an extra quality of metal to be incorporated in the casting, then pouring molten metal into the mold to form the body of the casting.

777,363. CONVEYER-BAND.—Franz Abels, Viersen, Germany, assignor to Kaiser's Kaffeegeschäft, Gesellschaft mit Beschränkter Haftung zu Viersen, Viersen, Germany. The combination with the metal rods of a conveyer-band arranged at a certain distance one behind the other, of strips of pliable material, the ends of the metal rods being flexibly connected with the said strips.

777,375; 777,376 and 777,377. CONVEYER.—William T. James, Chicago, Ill. A single-strand conveyer chain comprising a monobar link provided at one end with a stud and at the opposite end with a sleeve to interlock with the stud of the next preceding link, the stud and sleeve projecting on one side beyond the line of the link.

777,379. ORE-LEACHING APPARATUS.—William S. Jones, Greensburg, Pa. A leaching-tank having its bottom divided into a series of independent compartments combined with pipes discharging independently to and leading independently from each of the said compartments, the pipes connected to each compartment being each connected with a common supply and each provided with its own independent valve.

777,388. METHOD OF GRANULATING SLAG.—John G. McDowell, Pittsburg, Pa. A method of treating liquid slag consisting in spreading a stream of fluid slag into sheet form and then driving a liquid against the slag sheet.

777,410. GRINDING-MILL.—Louis E. Gaisser, Louisville, Ky., assignor to Alice R. Gaisser, Louisville, Ky. In a grinding-mill, a base-plate provided with means for attachment to a support, with a forwardly bent lower portion, with laterally extending protuberances, two at one side and one at the opposite side thereof, and with a flange extending forwardly from the upper portion and the sides of said plate including the protuberances at the sides and thence converging downwardly at the sides of the forwardly bent portion, coöperating with the latter to form a discharge-chute.

777,415. APPARATUS FOR CHARRING WOOD REFUSE OR THE LIKE.—Werther A. G. von Heidenstam Skönvik, Sweden. The combination, with a retort for charring wood refuse, peat or the like, of a plunger and guide-rods provided with a bottom plate and a series of guide-plates.

777,421. ASSAY-BUTTON DROPPER.—Edward Keller, Albert Ferrell, and Kenneth W. McComas, Baltimore, Md. In metal-assay work, an assay-button dropper embodying a portable handled support for a series of buttons adapted to be introduced into the furnace and a slide mounted on said support for simultaneously discharging all of the buttons from the support into cupels arranged in the furnace for their reception.

777,448. ROLL CRUSHING-MILL.—Thomas L. Sturtevant, Quincy, and Thomas J. Sturtevant, Wellesley, Mass. In a roll crushing-machine, the combination with a pair of crushing-rolls and shafts by which said rolls are carried, of bearing-boxes for said shafts, open-topped carriers or pedestals supporting said bearing-boxes and suitably recessed, said boxes being movably mounted in said carriers or pedestals, springs in the recessed portions of said carriers or pedestals, for yieldingly forcing said crushing-rolls toward each other, and means for relaxing or removing the pressure of said springs from said bearing-boxes when it is desired to remove said boxes from said open-topped carriers or pedestals, or insert said boxes therein.

777,498. BLAST-FURNACE.—John Coyne, Allegheny, Pa. The combination of a blast-furnace having an outlet for the normal escape of gas, an explosion-chamber connected to the furnace and means within said chamber for separating the gases from dust.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy.

Week Ending December 3, 1904.

24,082 of 1903. PNEUMATIC COAL-CLEANER.—R. and J. Edmondson, Wigan. Pneumatic apparatus for separating dust from coal.

26,511 of 1903. MAKING ZINC SHAVINGS.—T. P. and J. Macnab, Manchester. Improved lathe for cutting zinc disks into fine shavings.

28,464 of 1903. ROASTING FURNACE.—T. Edwards, Ballarat, Victoria. In roasting furnaces, a series of rotating rabbles arranged in two rows and their paths all intersecting.

28,585 of 1903. MAKING BARIUM PERMANGANATE.—A. Tixier, R. Camber, and C. E. Adnet, Paris, France. Method of making barium permanganate by treating an alkali permanganate with chloride or hydroxide of barium.

28,710 of 1903. EXPLOSIVE.—J. Russell, Hamilton. The addition of nitrotoluol to nitroglycerine and other blasting explosives to prevent them from freezing.

263 and 3,628 of 1904. CONDENSING ZINC FUMES.—C. S. Brand, Warwick. Improved condensing apparatus for zinc smelting, so as to extract all the lead from the zinc vapors.

11,204 of 1904. VENTILATING FANS.—I. Edwards Ammanford. Improvements in the method of constructing fan blades of fans for ventilating mines.

13,489 of 1904. ELECTRIC SEPARATOR.—F. O. Schnelle, Frankfort, Germany. An electric separator with a hopper rotating on a vertical axis, which throws the material sidewise as it revolves, the magnetic portions being thrown farther by the assistance of the magnetic attraction.

20,159 of 1904. SEPARATING SULPHIDES FROM GANGUE.—J. H. Gillies, Melbourne, Victoria. In separating sulphides from gangue by the "saline process," improved apparatus for introducing the material into the vats.

SPECIAL CORRESPONDENCE

San Francisco. Dec. 15.

The Straughan Mining Co., of Butte county, has brought suit against the Big Butte Mining Co. to recover damages alleged to be due to the defendant's water ditch breaking and flooding the John Dix mine, owned by the plaintiff. The Big Butte company discontinued operations after spending considerable money in building ditches and flumes, and the ditches, it is said, have not been kept in repairs.

At Grass Valley a suit has been brought by W. C. Body against W. H. Welden and wife to quiet title to the Gold Bar mine, owned by the latter. The suit grows out of a mortgage held by Body.

The Mountain Copper Co., of Keswick, Shasta county, is now paying one-fifth of all the taxes of that county. This is a good example of the advantage of having in a community a large productive mining company with an extensive plant. The Mountain Copper Co. employs more men than any other half dozen mining companies in California put together, and its reduction works are also by far the largest. The plant is, moreover, being enlarged.

A proposition is under consideration to open and build a 50-mile road from Mecca, Riverside county, to the Virginia Dale mines. That whole section is badly in need of good roads to connect the mining districts with the railways.

A Redding, Shasta county, firm of attorneys has been instructed to secure a site for ore bins and freight depot in that city. As this firm acts as attorney for Capt. J. R. De Lamar and the Bully Hill Copper Mining & Smelting Co., it is surmised that their interests really desire the depot. As this means another railroad for Redding, already the center of an important mining region, the citizens are naturally pleased.

It is announced that the Zada mine, in the Amalie district, Kern county, will shortly have a large mill to handle all the ore produced. Over $100,000 has already been expended on improvements on this property, to the great benefit of the entire district. There are numerous mines thereabouts, more or less developed, but one big property, with a complete reduction plant, will do much to attract further attention to the district.

Near Hodson, Calaveras county, the Rosella Mining Co. intends erecting a 10-stamp mill, and another 10-stamp mill is being put up on the Mountain King mine, owned by Womble Brothers and R. B. Parks, near the same place.

J. E. Doolittle, of this city, for himself and other San Francisco and Eastern capitalists, has purchased 1,600 acres of dredging land on the north side of the Yuba river, 10 miles east of Marysville. The land was formerly owned by James O'Brien, H. D. Mitchell, Daniel Shay and the estates of P. George and A. Eymand. The purchase price was about $350 per acre. The ground has been thoroughly prospected, so that dredges will soon be built to work it. Already over $2,000,000 have been invested in dredging lands along the Yuba within the past two years.

The Thomas Mahoney farm, in Linda township, on the south bank of the Yuba river, has been bonded by the Hammon company for dredging purposes.

The Butte & Yuba Placer & Dredge Mining Co. has been organized, with the following officers: W. F. Gates, president; R. M. Green, vice-president; Harry Ruggles, secretary. The capital stock of the company is $500,000. The company was organized to mine Gooch placer on the South Honcut, Butte county. It will mine this property on a large scale, and may put dredgers at work shortly.

It is expected that the property on the north fork of Cottonwood creek, Shasta county, bonded by Cone and Fish, of Red Bluff, will shortly be purchased for dredging, as prospecting operations by drill have been concluded.

On the Abbey ranch, at Honcut, near Chico, Butte county, gold in paying quantities has been found at the bottom of an old well, and the ground is considered suitable for dredging purposes.

The Bay Counties Power Co. is now supplying electric power to 27 active mining dredgers at Oroville, Butte county, as well as to five repair shops and four pumping stations. Between 50,000 and 60,000 cu. yd. of gravel daily are now being mined in that locality by the dredging machines.

CHAS. G. YALE.

Denver. Dec. 17.

The matter of protecting purchasers of worthless mining stocks is being agitated here to such an extent that a committee has been organized to prepare a bill, to be introduced in the next legislature, which will provide for the appointment of a State inspector of all mining corporations which do business in Colorado. The State Bureau of Mines looks only after the physical condition of the mining properties, but has nothing to do with the financial conditions under which they are operated. At the last meeting of the projectors of the above plan it was thought best to place the inspector under the State Inspector of Insurance, which is a branch of the State Auditor's office. There is no doubt of the value of such legislation, for millions of dollars have been absolutely thrown away by Eastern investors during the past few years by being sent to irresponsible promoters of absolutely worthless stock enterprises.

In the Court of Appeals the famous Coffin suit, which involves a large amount of valuable mining property in Creede, is being argued. The purpose of this suit is to recover a larger sum than was paid for the property when it was sold about 12 years ago. It is claimed that false representations were made to the owner by the purchasers in regard to the value of the property, which changed hands for only $15,000 at the time.

The famous Independence Consolidated mine, better known as the Hull City placer in the Cripple Creek district, which has a magnificent record as a producer, has resumed operations, the differences between the lessee, A. E. Carleton, and the company having been adjusted.

The announcement is made that on Christmas day the Boulder-Ward line of the Colorado & Northwestern will reach Eldora, the extension being very nearly completed.

The Colorado, New Mexico & Gulf Railway Co. filed its incorporation papers a few days ago at the office of the Secretary of State, the capitalization being $500,000. The company expects to build a line from Durango to a point on the Colorado-New Mexico line, where connection will be made with the projected Durango, Albuquerque & Gulf railroad. The directors are: Francis J. Torrance and Arthur Kennedy, of Pittsburg, Pa.; T. Lee Clark, of Allegheny, Pa.; William H. Andrews, of Albuquerque, and W. S. Hopewell, of Hillsboro, New Mexico.

A great deal of activity is at present being displayed at the Colorado Fuel & Iron Co.'s steel plant at Pueblo. The November pay-roll amounted to $253,000. The company is in keen competition in the West with its rival in Pennsylvania, and large orders for the Harriman, Gould and Hawley railroads are booked for future delivery.

The board of trustees of the Colorado State School of Mines has submitted its annual report for 1904 to the governor. At a cost of about $57,000, which does not include the cost of ground and equipment, Stratton Hall has been completed. The late Mr. Stratton, of Colorado Springs, donated $25,000 for the purpose, and Mr. Simon Guggenheim has added $1,000. It is to be hoped that the next legislature will be more liberal towards this institution than has been the case of late years. The school is getting a wide reputation, and it owns property valued at more than $325,000. Up to the present time nearly 300 young men have graduated there, and there are at present 291 students registered.

The Reward Gold Smelting & Reduction Co., operating a large group of claims in Enterprise district of Gilpin county, has declared its third consecutive monthly dividend of seven per cent. The company is planning the erection of a milling plant on North Clear Creek at an early date, as it claims to have plenty of low-grade ore bodies opened up to keep their own mill running. B. L. Campbell, Central City, Colo., is manager.

Duluth. Dec. 17.

Pickands, Mather & Co. have been preparing plans for an extensive increase of operations the coming year, and will doubtless mine far more than the 1,143,000 tons they produced this year. Most of their stocks have been shipped, but they hold 80,000 tons at one Menominee property. On the Mesabi range they will open their new Syracuse, a property just secured and in section 6-58-15, containing a body of excellent ore. A drop shaft will be sunk this winter. Considerable difficulty is looked for in the job, for if there is any point on the Mesabi where water can be confidently expected it is at this property. There may also be quicksand and boulders. Other Mesabi properties of this company are in good shape for an enlarged production, and can be relied on for any output the company may probably require. On the Menominee the company has plans that call for a considerable expenditure. Large Gates centrifugal crushers are being installed at the Vivian, a No. 7½, and at the Baltic, a No. 8, both very large and powerful crushers. Caspian is to be unwatered and reopened for mining on a considerable scale. Both Hemlock and Baltic will be sunk another lift and developed for mining on the new levels. Both these mines produced heavily this year. On the Gogebic range the company has recently reopened the Mikado mine, and will rush its development. It is pumping out the Cary, so that mining and exploration can begin there shortly. It is probable that Pickands, Mather & Co.'s mine operations for the coming year will mean an output of at least 1,500,000 tons.

The Fayal mine on the Mesabi range has begun to hoist ore from No. 4 shaft, which has been two years under construction. It is surmounted by a fine steel shaft-house and is sunk in rock its entire depth. It has been connected with the mine workings and will be the main avenue for hoisting, ultimately displacing the present shafts, which are all in ore. No. 3 shaft is practically abandoned, but No. 1 and 2 have been stocking ore rapidly for two weeks. Three steam shovels are at work day and night stripping the big pit south of old No. 1. In all about 850,000 yd. of material have been removed on the 2,000,000-yd. contract at this mine, and all but about 30,000 yd. have been taken off since April, 1904.

The Cleveland Cliffs Iron Co. has brought suit for $92,000 against the East Itasca Mining Co., to recover for advance royalties alleged to have been overpaid when the Crosby mine was taken by the claimants, two years ago, on explorations conducted by the defendants and accepted by the others. Both parties doubtless believed these estimates to be correct, and the later discovery that not so much ore existed in the mine as had been stated was probably as much of a surprise to the Itasca company as to the Cleveland Cliffs.

The Syracuse mine, a new property of Pickands, Mather & Co., is to be opened this winter, and work on a shaft will begin at once. The Webb mine, bought two years ago by W. P. Snyder & Co., is to be opened this winter, unless present plans are modified. It will be an underground mine and contains a large deposit of medium-grade ore. The Pitt Iron Mining Co. is to strip its Wacouta property, lying east from Mountain Iron, and will probably let the contract shortly. It is a deposit of fair size and grade and has little overburden. The Tesora Mining Co.'s Forest mine will sink the shaft another 50-ft. lift and will employ about 100 men for the winter. It is mined by the milling process.

Some stripping will be done at the Duluth mine, at Biwabik, this winter, but the property will not be worked very heavily.

The Duluth & Iron Range road, practically all of whose stock is held by the United States Steel Corporation, earned net during the past fiscal year $4,003,215. Its capital stock is $3,000,000, and it has just paid a dividend of 150 per cent, which is the fourth paid in the course of its 20-year existence. It still has a surplus of nearly 100 per cent. The Duluth, Missabe & Northern, also belonging to the United States Steel Corporation, has just declared a dividend of 150 per cent on its capital of $2,512,500 and carried over a surplus of $3,163,000. It also has paid occasional dividends.

Operations have begun at the grinding mill

of the North Shore Abrasive Co., of Duluth. This company has been putting in a mill and testing its cliffs of feldspar for the past few months. It is found that this rock makes a splendid abrasive, and as a material for sandpaper is unsurpassed. The company owns an enormous cliff of it, rising from deep water on the shore of Lake Superior, and in such a way that the cost of mining and handling is reduced to a minimum. There are millions of tons of feldspar in the cliff. A dock has been built a few feet out from the bank, into deep water, and a mill erected so that rock can be mined, dropped into the mill, crushed and dropped down by gravity to the dock warehouse. An active campaign will be carried on the coming winter in selling the product to sandpaper works and other abrasive manufacturers, and it is probable that the works will be operated heavily the coming year. There are many great cliffs of feldspar in northeastern Minnesota, near the lake, but none of them is so close to the shore and so well situated for cheap handling as this at Split Rock bay. Reports have been published that these deposits are corundum, but this is not correct; they are a high-grade feldspar and valuable for many abrasive purposes for which corundum is too costly. This material can be sold, prepared for the market, at a very low price.

Deadwood. Dec. 17.

It has been definitely announced that the Homestake Mining Co. will resume the payment of its extra dividend of 25c. per share on January 25. The regular monthly dividend of this company is 25c. a share, which, with the 'extra,' makes a total of 50c. The announcement has caused a raise in the price of the stock, sales being reported at $73. Two months ago the shares sold as low as $52. The payment of the extra dividend was suspended something over a year ago, since which time the company has been making large improvements in its mining and milling equipment, calling for the expenditure of large sums. Now that the treasury has been reimbursed for these outlays the profits of operations are to be divided with the shareholders on the basis of a larger dividend. Then, too, the company is producing about $60,000 per month more at present than a year ago.

A payment on the purchase price of the Bullion property at Keystone, amounting to $25,000, was made last week by F. H. Long, president of the Bullion Gold Mining Co., of Chicago. The former owners of the mine are residents of Keystone and vicinity. Mr. Long states that his company is having plans drawn for a large stamp mill, which it expects to erect early next year.

The annual stockholders' meeting of the Victoria Gold Mining Co. was held in this city this week. The following officers were elected to serve for one year: A. B. Smith, president; Arthur C. Smith, vice-president; W. M. Glass, managing director, all of Omaha, Neb.; A. J. Malterner, treasurer; J. C. Carson, secretary; George S. Jackson, general manager; all of Deadwood. James Hartgering, of this city, submitted plans for a 200-ton dry crushing cyanide mill, which were adopted, and the money was voted for the immediate construction of the plant. The mill will be constructed at Maurice station, on the Burlington railway. The site is some 3,000 ft. from the mine, and an aerial tram will be used to transport the ore. Work will begin as soon as the weather will permit.

Work has been resumed in the shaft of the Saginaw company at Custer. L. P. Woodbury, the president, was at the mine last week and started operations. At present cross-cuts are being run from the 250-ft. level to open known orebodies, and sinking to the 500-ft. level will soon be under way. The company is contemplating the erection of a stamp mill next spring.

The Stilwell Coal Co. is employing a force of men in the Barrett mines at Aladdin, Wyo., preparing the property for heavy coal production. It is said the company has a contract with the Homestake to supply a portion of its fuel. W. A. Remer is general manager.

The Gilt Edge-Maid company's new cyanide plant at Galena has been put in commission.

JESSE SIMMONS.

Salt Lake City. Dec. 17.

The Columbus Consolidated mine at Alta is now shipping regularly. The mill is running with three shifts, working on about 120 tons of ore daily. The company is also supplying the market with considerable high-grade ore.

The open winter has favored the Continental Alta Mines Corporation in its campaign of construction. The new 100-ton mill is completed and the five-mile tramway, which is to connect the plant with the mines at Alta, will soon have the finishing touches put on. So far the winter in Utah camps has been a very mild one. Very little snow has fallen.

The Ohio Copper Co., operating at Bingham, which recently purchased the Winnemucca mine and mill in lower Bingham, will begin to enlarge its plant to 500 tons daily capacity as early in the spring as possible. Henry Catrow is manager.

The past few months have witnessed some important developments in the O. K. and Old Hickory mines, owned by the Majestic Copper Mining & Smelting Co., near Milford. A conservative estimate places the tonnage available in the O. K. at one million. The ores are of a character that requires concentration. In Old Hickory the ores represent purely a smelting proposition, containing about 40 per cent iron, with low values in copper. Preparations are being made in the latter to sink the shaft deeper, and in preparation for it a new air-compressor plant is being installed.

The management of the Daly-West company has made public figures bearing on the metal output for the year, month of December estimated. Sixty thousand tons of dry ore and concentrate have been handled, out of which was obtained 258,300 lb. of lead, 3,145,000 oz. silver, 2,457 oz. gold, 2,082,000 lb. copper, and 6,597 tons of zinc. From this was realized $1,820,500, net. During the year $1,044,000 was paid out in dividends.

The Frisco Contact Mining Co., which has been developing a group of claims covering the north extension of the Horn Silver vein at Frisco, is preparing to install new machinery, which will include a powerful hoisting plant. D. P. Rohlfing, of Salt Lake, is the manager.

The Manning mill, owned by the Consolidated Mercur Co., which has been operating on a tailing dump during the year, has closed down.

The Salt Lake valley smelters have employed two noted experts to examine into the smoke question, now an issue between the farmers, who claim that their property is being denuded of vegetation, and the smelter men. For this work Dr. Franz Meyer, of Germany, and Mr. Stuart Croasdale, of Colorado, have been chosen.

Spokane. Dec. 15.

Ruby and Loop-Loop, two pioneer silver camps in Okanogan county, Wash., which were scenes of great activity in the early 80's, have again come to life. Jonathan Bourne, a Portland operator, owning the E. & E. in eastern Oregon, has revived operations on his Last Chance group. Both the towns were incorporated during boom days and floated bonds, which proved absolutely worthless when the last soul moved from town, and fires did the rest.

The management of the Highland mine at Sumpter, Ore., announces that a test mill of from 50- to 75-ton capacity will be installed at once.

The Grand View mine, near Loomis, Okanogan county, Wash., is under development, and an electric power plant has been shipped from the east to operate the mill and furnish power for the drills.

The deep level on the Belcher mine, near Republic, has come into 12 ft. of solid ore, two feet of which are solid chalcopyrite and the rest a fine gold-copper ore, rich in iron. The strike is at a depth of 600 feet.

The output of Cœur d'Alene mines continues smaller, because of water famine. The November output of 19,000 or 20,000 tons is 1,000 tons less even than the October shipments. The Morning is the chief sufferer. Bunker Hill and Sullivan and Federal properties are not badly hit. The Snowstorm copper properties cut shipments by 500 tons to 3,500 tons for November.

Under the new mine-taxation law, recently passed at the instance of big operators by the Idaho legislature, the 1903 taxes should all be paid by December 31. The taxes will be over $70,000 on net profits and over $29,000 on improvements. The mine owners furnish annual sworn statements of net profits or losses on operations during the year, and taxes are levied on the profits.

Following is the table of profits and taxes by the principal mines, as listed for 1903:

	Net profit.	Profit tax.	Imp't tax.
*Standard-Mammoth	$595,038	$13,743	$1,482
*Last Chance	382,652	14,349	2,151
*Tiger-Poorman	21,036	578	2,678
Bunk. Hill Sullivan	237,497	10,781	4,441
*Wallace Mills			3,686
Morning	346,420	10,912	6,079
Hercules	438,746	12,065	547
Hecla	84,735	2,330	1,512
Cleveland	9,292	292	8

* Now owned by Federal Mining and Smelting Co.

The Golden Chariot Mining Co., of eastern Oregon, has purchased the Golden Wizard's mining plant and 12-stamp Merrill mill. The mill has never been set up.

Abrams Bros., of Seattle, have purchased the Belmont group of gold-silver-lead claims near the Paragon property at Northport, Wash., for $6,000, and have started development.

Although winter has set in at the Seven Devils, in Idaho, and snow is two feet deep, there is considerable activity. The Idaho-Gold Coin works 30 men at the mine and a full crew at the 100-ton cyanide mill. The Iron Spring Co., recently re-organized, employs 25 men. The mill now at Council, Idaho, will be brought in next spring.

Butte. Dec. 16.

J. H. McCabe and others, who own a large area of promising copper-silver ground in the Corbin-Wickes district of Jefferson county, are prospecting their property with a diamond drill. The hole is 285 ft. deep, and is going down at the rate of 16 ft. per day. The surface showing is good, some native copper and rich quartz having been gathered from the gulches. As a copper-silver ore producer, the future of the property is to be determined. Other mines there have yielded large quantities of gold, silver and lead ores, but prior to the advent of Mr. McCabe and his associates, some of whom are Salt Lake men, no particular attention had been paid to the copper-silver prospects.

Montana men have taken hold of the Golden Sunlight group of claims, 42 miles southeast of Butte, and will put a force of men to work on it next week. This property comprises 17 patented claims, a stamp mill and other paraphernalia for the treatment of gold ores, and was formerly owned by the American Developing & Mining Co. Litigation forced the affairs of the company into the hands of a receiver several years ago. Last year the receiver sold the Golden Sunlight property for $17,000. Much of the value of the ore was lost in the tailing, while the mill was in operation. Last summer tests of the rock were commenced with a view of remedying the defect. It is claimed that the problem has been solved by them and that the property will be worked on an extensive scale during the coming year.

After a suspension covering a period of a month the Parrot mine, owned by the Parrot company, will go into commission again tomorrow. During the shutdown about 250 ft. of the shaft was re-timbered.

The Alder Gulch Dredging Co. is building a new dredge boat at the mouth of Alder gulch, Madison county, at a cost of $100,000. It has had two boats in operation during the year and expects to have the new one dredging by April 1.

The Boston & Montana is sinking the shaft on its West Colusa mine from the 1,400 to the 1,600 ft. level. This mine is one of the large producers of copper-silver ore in the Butte district, and was formerly owned by W. A. Clark. The Mountain View and Pennsylvania are the only mines belonging to the Boston & Montana that have deeper workings, the former being 1,850 and the latter 1,560 feet.

W. A. Clark is placing a large pump on the 1,800-ft. station of his Original mine, and will have it running by February 1.

The Montana Zinc Co. will complete its work of overhauling the large mill of the Alice company about December 18 and will begin crushing ore next week. From the beginning until the first of the year the work will be practically experimental. A little time will be required in which to adjust the machinery. Clarence B. Wisner, president of the company, has invented a new device for concentrating dry ores, and will use it in the process. The discovery was made by him while tests of Alice ore were being made in the mill.

Bisbee. Dec. 17

For some time the Calumet & Pittsburg has been figuring on sinking a second large working shaft, on the Del Norte claim, which lies quite close to the Lowell shaft and workings of the Copper Queen company. It has been decided to sink this at once, and work begins as soon as the ground can be surveyed off and the opening located. It will be pushed very fast, for it is intended to make it a producing shaft in as little over a year as possible. The shaft will go down at least 1,000 ft. before any drifting is done. The new shaft will be 2,500 ft. from the company's Briggs shaft, which is now handling all the water of the camp. From workings close to Del Norte ground it is known that the property is very rich, and there is reason to believe that it contains a large body of high-grade sulphide running so well in copper as to be almost beyond belief. This has been determined by the drifts from Lowell shaft, which are running around Del Norte in opening its own ground. Briggs shaft pumps have been stopped by some accident, the extent of which is as yet unknown, but is not thought to be serious. They have been working for some months at high pressure, throwing about 2,500 gal. a minute against a static head of 900 ft., and have not given the slightest trouble from the day steam was turned on until now. It is not supposed that water will rise, even if the stoppage is of some duration, for heretofore, whenever the smaller pumping plant was stopped the water has remained where the pumps left it. These main pumps are about 140 ft. above the present water level, and from the time they started up they have drained the ground as they have lowered the water. It may be 10 days before the engines are started, according to reports.

It is reported from the East that the Westinghouse Electric Co. has secured a copper property in the Washington district, 40 miles from Bisbee, that it is to develop to supply all its copper. Some $600,000 worth of work is said to have been done on the property. This has been generally known on the inside here for a month, but no great importance is attached to it, for the reason that the property is an exploration, and not a remarkable one at that, and the statement that $600,000 has been spent there is looked upon as improbable. If the Westinghouse people do find a property for their needs, it will be the first time they have succeeded, and they have been looking for these many years past.

Cochise Consolidated, east of Paradise, on the northern spur of the Chiriachua mountains, is to increase its force largely and become an active exploration. It has been shipping a few cars a month of good looking ore for some time, and will now develop for a large producer. It is probable that the Southern Pacific will build in from its main line, as it is nearer this end of the Chiriachuas than is the El Paso & Southwestern road of Phelps, Dodge & Company.

It has been rumored for the past week or two that the American Development Co. was to be made a full-fledged development concern, and stock to the amount of about $400,000 issued at once. This is without foundation, for nothing will be done with the company for many months yet.

Interests connected with the Calumet & Arizona company have bought about a square mile of ground on the Naco flat, south of its mines, and the probability is that they have a new smelter site in mind. This is close to the mines, and it is probable that plenty of water can be developed there. This fact will be determined shortly. If this site is selected for a smelter a large and most modern plant, good for ultimately from 125,000,000 to 150,000,000 lb. a year, will be erected there.

Toronto. Dec. 17.

The arrival of four carloads of silver ore in New York from the mines in the Temiskaming district was recently noted in the daily newspapers. There are several inaccuracies in the accounts as published. Three carloads of the ore are from the mine on Lake Temagami (not Lake "Ptarmigan"), the principal owners of which are L. H. Timmins and D. A. Dunlap, of Mattawa, Ont. A smaller consignment is from a mine in the immediate neighborhood of the other, belonging to W. G. Tretheway, of Toronto. The reports of the large offers said to have been made on behalf of the Standard Oil Co. for these mines are regarded in official circles as altogether fanciful.

The Dominion geological survey has just issued a bulletin on the peat resources of Canada by Dr. Chalmers. It gives the total known peat areas of the Dominion at 37,000 square miles, but the author considers it probable that future explorations will increase this considerably.

C. H. Howland, a lawyer of Cuyahoga Falls, O., is suing John Patterson, of Hamilton, Ont., and the Nickel Copper Co., of Ontario, for $3,500, claimed to be due on options secured for the company on mining locations in New Ontario.

The Alaska Consolidated Mines is registered at Ottawa with a capital of £1,500,000, with power to prospect for gold and other metals and precious stones.

Paul Paradis, government engineer, is on his way north to superintend the construction of the trail from Athabasca landing to Peace river, where a gang of men is now at work. This trail will be the first section of the proposed government road to the Yukon, which is to be put through by the Department of Public Works.

The Ontario Bureau of Mines has received information that a fine copper mine has been discovered in Hudson township, about five miles from New Liskeard, in the Temiskaming district, by John Martin, a resident of the locality. Prospectors who have inspected the property regard it as a very rich find.

The Ontario Clay Workers' Association held its third annual convention at Waterloo on December 7, about 100 delegates being present. Among those in attendance were T. A. Randall, editor of the *Clay Worker*, Indianapolis, Ind.; H. Dejoannis, editor of the *Brick*, Chicago, and Prof. W. G. Miller, Provincial Geologist, Toronto. President B. E. Bechtel, Waterloo, occupied the chair. Among the topics discussed were: 'Machinery, and Keeping It in Proper Order,' discussion led by J. H. Janes, Delaware, Ont.; 'Manufacture of Tile,' opened by Wm. Anderson, Walkerton; 'Burning Question of Brick and How to Lower Cost of Same," discussion led by S. J. Fox, M. P. P. Lindsay. D. W. H. Moody, Highgate, was elected president; E. J. McCormick, Warwick, vice-president; Charles H. Bechtel, Waterloo, secretary, and N. Janes, Delaware, treasurer.

G. G. S. Lindsey, general manager of the Crow's Nest Pass Coal Co., of Fernie, B. C., was recently in Toronto. He stated that the long-standing differences between the company and the Canadian Pacific railway had been adjusted, securing to the Canadian Pacific railway right of way and to the Crow's Nest Pass Co. the conveyance of 250,000 acres of coal lands. Under the lease of the Coal Creek branch railway, which takes effect December 15, the coal company will operate the line from the Coal Creek mines to Fernie, obtaining direct connection with both the Canadian Pacific railway and the Great Northern railway to Fernie. This will considerably enlarge their market and make the haul between the mines and the Montana smelters, which they now supply with coke, much shorter. Mr. Lindsey stated that the present output of the company was about one million tons of coal per year.

H. B. Harmon, of Chicago, who is interested in gold mining operations at Dryden, in northwestern Ontario, visited the mine this week. The machinery, which was installed this fall, is in full operation.

The Manitoba Pressed Brick Co., Ltd., has been incorporated under the laws of that province with a capital of $60,000.

Victoria. Dec. 17.

The Coast.—Production of high-grade bituminous coal at the Comox colliery is being increased. The output for some time past has been 100 tons a day, which was taken out in the course of development. A level is now being driven.

A bond has been acquired by the Daly Reduction Co. on the Maggie group of copper claims on the Cariboo road, 18 miles from Ashcroft. It is reported that the purchase price of the property is $160,000, and that a large sum will be expended in development.

J. B. Hobson, manager of the Consolidated Cariboo Hydraulic Co., who has returned to Victoria for the winter, states that during the past season piping was carried on for 88 out of a possible 220 days, the average daily recovery being $980. At the annual meeting of the company, to be held shortly, the question of providing additional capital for improving the water system will be discussed, it being imperative that the undertaking should not, as now, be dependent to a large degree on favorable weather conditions for an adequate water supply. A further expenditure of $500,000 is contemplated.

Lardeau.—The combination mill at Five Mile is now in steady operation, 2,000 oz. of gold and silver bullion having been produced since November 14. In consequence, the working force at the Silver Cup mine has been increased. In the Poplar Creek section the Morning and Homestake claims on Rapid creek have been bonded by the Spyglass company, while a promising orebody carrying high values has been opened on the Mother Lode claim.

Nelson.—Shipments of lead ore to the Hall smelter last month aggregated 2,510,409 lb. from 20 mines.

The annual report of the Hastings Exploration syndicate, operating the Arlington mine, near Erie, and owning other properties in East Kootenay, shows a further improvement. The cash on hand has been increased to about $20,000, while general expenses have been materially reduced. The ore shipped during the year realized, after deducting costs of freight and treatment, in round figures, $45,000.

Rossland.—Operations at the Rossland Power Co.'s mill at Trail have, after a trial run of some weeks, been suspended on the ground that the coarse concentrate produced has proved to be too low in grade, all the values therefrom in the form of finely disseminated sulphides passing into the jig tailing. It is proposed, therefore, to install additional concentrating tables to treat the pulverized product before it is subjected to cyanide treatment.

At a meeting of the Rossland Board of Trade last week resolution was passed favoring the proposal of petitioning the Canadian government to offer a bonus on the production of copper. The resolution was supported by Mr. Kirby, manager of the War Eagle-Centre Star mines, and others, who pointed out that the lead mines which were now being subsidized had paid larger sums in dividends than our copper mines, although the latter represented a far greater investment of capital.

Boundary.—It is announced that the Granby company will expend $125,000 in improvements next year, the Spokane Iron Works having already received a contract for the installation of two additional furnaces. Negotiations are meanwhile in progress for the lease or purchase of the B. C. mine in Summit camp by S. F. Parrish, formerly manager of the property, and associates, and arrangements are also being made for the sale of Boundary Creek Mining & Milling Co.'s mines, near Greenwood. The Goldfinch, a gold-silver property on Twin creek, was sold last week to a Chicago purchaser.

East Kootenay.—The November output of the Crow's Nest collieries aggregated 74,569 tons, of which 21,107 represented coke.

Development work is being actively prosecuted at the Bull River Mining & Power Co.'s mine. A considerable amount of gold is reported to have been recovered from bedrock during the construction of the dam.

Monterey. Dec. 14.

It is probable that none of the new work projected in the Republic is on a larger scale than that of the two widely separated companies, the Guanajuato Reduction & Mines Co., in Guanajuato, and the Lluvia de Oro Co., in the State of Chihuahua, both of which have been often mentioned in these columns. The Guanajuato company has a $5,000,000 capital. Early this year it took over the Rule estate, including mines, haciendas and dwellings. The company is closely allied to the General Electrical Co., and Chas. L. Kurtz is president, Leon O. Bailey, general counsel, H. H. Filley, chief engineer in charge, and C. W. Van Law, general manager. The plans include the immediate erection of a 160-ton stamp mill near the Cata mine, and closer to town a 500-ton cyanide mill, which may be increased later to 1,000. The pulp will be piped from the stamp mill to the cyanide plant, a distance of about one and one-half miles, down a two and one-half per cent grade. The company is at present working in a small way at the mines, with some 400 or 500 men employed, but before the end of next year the unwatering of the Valenciana and other old holdings will be started, though the company is not in any special hurry about this matter, for the old dumps, the accumulations of over a century, are estimated to contain something like 2,000,000 tons, which can be cyanided at a profit.

The Lluvia de Oro, in Chihuahua, bought in July, 1903, for $2,000,000 gold, has now over $4,000,000 of ore blocked out. There is at present only a 20-stamp mill. But those in control, H. S. McKay, of Los Angeles, Cal.; H. E. Carey, New York, and R. J. Coleman, Denver, have formed a $10,000,000 company, with offices in New York, and, though the plans are not made public, it is known that work will soon be prosecuted on a large scale. About 25 miles from the Lluvia de Oro, at Baguariachic, near Urique, the Guggenheim Exploration Co. is developing a very large low-grade copper proposition, which is at present too far from the railroad, and 20 to 30 miles from the proposed line of the Kansas City, Mexico & Orient railroad.

Sydney. Nov. 21.

The gold yield for the State of Queensland for the month of October amounted to 48,207 oz. fine, and falls short of that of the same month last year by 11,605 oz. fine. A marked decrease is exhibited in the returns from the Charters Towers Field, and is in a measure attributable to the temporary restriction of the output from several of the principal mines, as a result of the fire in the Brilliant mine. A falling off in the value of the ore crushed from this and Gympie Field is also noticeable. The Mount Morgan gold mine records a steady increase in the yield, and the general indications promise that this improvement will be well maintained. To treat the large body of copper ore disclosed at the 750-ft. level in this mine three blast furnaces are to be erected.

The gold won in the State of New South Wales during the month of October was 13,983 oz. fine, and compares unfavorably with the yield for the same month last year. The returns from the principal mines were generally disappointing and much below the average.

In the State of Victoria a decrease in the yield for the month of October has also to be recorded, the actual production for the month amounting to 66,270 oz. fine. At the Bendigo mines work is exceptionally active, and highly payable returns are reported; prospecting at the deep levels is also being vigorously proceeded with. The mines at Berringa are making satisfactory headway, and the Birthday mine (Berringa) stands out prominently as a dividend payer. Consequent on the highly remunerative yields obtained by a number of the companies working the deep alluvial leads, and also by the dredging companies, much interest has been manifested in these stocks. With the object of stimulating and encouraging mining in the Arltunga district, the government of South Australia has made a libaral monetary grant.

The high price recently ruling for lead has resulted in attention being largely centered in Broken Hill stocks. During the past month four of the principal mines declared dividends aggregating £77,500. The output of the Broken Hill Proprietary Co. for the past four weeks was 1,273 oz. gold, 326,386 oz. silver, 5,191 tons soft lead, and 43 tons antimonial lead. The manufacture of sulphuric acid by this company promises to become an extensive industry, as already a good demand exists locally for the product. Highly encouraging reports continue to be received respecting the results obtained by the various processes for the separation of the zinc, etc. The Sulphide Corporation is about to install 10 more Mechernich magnetic separators at the Central mine, in addition to the twelve already at work. Yet another process, the invention of Mr. A. de Bavay, of Melbourne, is anounced for the treatment of zinc tailing. It is claimed that by this process the sulphides are separated from the gangue by means of flotation in water, no chemicals or heat being required. It is asserted that this process separates more zinc and silver, and less lead than the acid process, while there is the additional advantage that the concentrate is free from sulphuric acid, or salt cake. Working with this process, a concentrate assaying from 48 per cent to 52 per cent of zinc, 1 to 4 of lead, and 12 oz. to 22 oz. of silver is said to have been produced. The process has been taken in hand by a company and is to be tried at one of the principal mines.

The Broken Hill Block 10 Co., in the report for the half-year ended September 30, states that the ore treated amounted to 70,643 tons, and averaged silver 13.15 oz., lead, 14.8 per cent, and zinc 16.8 per cent per ton. The working expenses amounted to 18s. 9d. a ton. The new plant and other work undertaken involved an expenditure of £83,950.

FRED. S. MANCE.

Johannesburg. Nov. 14.

After an absence of six months one finds as many changes on the Rand as would be noted in many other cities of the world after six years. What first struck your correspondent on his return was the activity in building. Many of the old corrugated shanties, which seem to hang on to Johannesburg as camp followers on an army, have disappeared, and substantial brick structures are being put up. The fine, 10-story 'skyscraper,' to be known as the 'Corner House,' being built by H. Eckstein & Co., is almost completed. Besides their own extensive offices, many other important firms have their local offices in the Corner House, as Allis-Chalmers, Fraser & Chalmers, United States Steel Corporation, etc. A similar building is being erected next to the Corner House by the National Bank, so that when the two are completed these skyscrapers will be very imposing and by far the largest of their kind in Africa. With all these office buildings going up the present high rents should come down considerably. A handsome building, one of the finest in Johannesburg, is almost completed for the Rand Club.

A start has at last been made on the much-needed electric tram service, but as the system is to be under municipal control it will be a little slow, I fear. Considerable work is being done by the municipality in improving some of the worst sections of the city. Progress is being made on the big water scheme for Johannesburg.

From a mining point of view there is a much more hopeful tone than there was six months ago. Last month's returns show a big increase in the gold output, due to the thousands of Chinese laborers now at work. One does not see the 'celestials' on the streets of Johannesburg, for most of them are located on the outside mines. They are new to the work, and as yet have not become experts, but their efficiency will increase with experience. One thing at least is now recognized, and that is that the Chinaman is by no means as tractable as the Kaffir. There have been several small quarrels in which the police were forced to interfere. Whenever arrests have been made the Chinese culprits have been severely punished, in one case with the lash, for it is recognized that if they are dealt with at first with a strong hand much trouble will be saved in the future. There will be trouble until the Chinese 'knuckle down' and make up their minds to abide by the terms of their contracts. Whenever necessary the police will be called in. It is said that the Chinese sometimes are able to carry on an illicit trade with the numerous unprincipled 'white trash' we have in our midst, and buy long knives, etc., from them. No doubt periodic raids will be made on the Chinese quarters and these dangerous weapons taken away. The demand for the white worker is still too small for the supply, although conditions are much better than they were six months ago. I fear we have reached that stage when we shall have "the poor always with us." The Rand is so well advertised all over the world that hundreds will come out in spite of warning to test their fortune. The Kaffirs seem to be coming to work in greater numbers. If the influence of the Chinese could only make regular laborers out of the Kaffirs a great work would be accomplished. The two races are being kept apart as much as possible. The Chinese laborer has not yet beaten the best record of the Kaffir, but in time it is hoped he will come up to them, and even do better.

T. LANE CARTER.

Auckland. Nov. 23.

During the ten months ending October 31 New Zealand exported 441,360 oz. (crude) of gold, valued at £1,684,003 ($8,420,015), an increase of 6,058 oz. in quantity and of £24,264 in value over the corresponding period of 1903.

During September and October the Molyneux river was fairly low, and in consequence the river dredges obtained some excellent returns, especially those working in the neighborhood of Cromwell. The river, owing to the melting of the snow on the mountains, has now risen to summer level, so that only moderate returns can be expected for the next few months.

Though the yield of gold from the dredging industry during the expired portion of 1904 is slightly in excess of that for 1903, it has not reached the figures obtained in 1902 by many thousands of ounces, and the remaining part of the year will probably increase the deficiency rather than lessen it. The industry may, however, be said to have paid its way. The average weekly yield of the Otago dredges has been about 1,750 oz., and that from dredges working on the west coast of the South island at 550 oz., or a total per week of about 2,300 oz. The apparent average per dredge per week is somewhat over 30 oz., but as many dredges are constantly laid up for repairs, etc., the real average is probably not more than 23 or 24 oz., equal to about £90 per dredge. Working expenses, including repairs, average £60, so that about one-third of the gold obtained represents gross profit and is available for dividends. Some deduction is necessary for claims which are practically total failures, but, on the other hand, there are a number of private dredging companies which do not publish their returns, but are known to be highly profitable.

The quartz-mining industry of the Reefton Goldfield is in a somewhat depressed condition at present. The following returns are reported from the group of mines controlled by the Consolidated Goldfields Co. of New Zealand: Progress mines, £9,656 ($48,280), from 5,373 tons; Golden Fleece, £1,264 ($6,320), and 11 tons of concentrate from 670 tons; Wealth of Nations, £1,398, and 10 tons of concentrate from 1,067 tons.

Hauraki.—The Waihi mine boasts a record return of £55,140 ($275,700) for the past month, but most of the other mines on this field show a falling off. A new mine that shows promise is the Golden Belt, at Neavesville, in the Tairua district, which is now crushing with 40 stamps. So far no return from this mine has come to hand. At Thames the Moanataieri company is obtaining some fairly good ore from a piece of unworked ground, the last return being £500 ($2,500) from 125 loads, or about 180 tons. The Kuranui-Caledonian is also on pay ore, but no other mine is at present even paying working expenses. The boring scheme appears to have proved a complete failure. Several holes were put down to depths of from 1,200 to 1,500 ft. without cutting any lode formation of value or proving anything regarding the rock formations that might not have been confidently predicted by any mining geologist.

PERSONAL.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. S. Herbert Williams is at Denver.

Mr. Philip L. Foster is at El Oro, Mexico.

Mr. J. Morgan Clements will remain at Bisbee several months.

Mr. J. Parke Channing has returned to New York from Tennessee.

Mr. Arthur Thomas left London for the Sudan on December 15.

Mr. S. F. Franco is on his way from London to Buluwayo, in Rhodesia.

Mr. Francis T. Freeland has returned to Colorado from Europe.

Mr. W. H. Weed, of Washington, was in New York on December 16.

Mr. John Campion, of Denver, is spending the winter at Pasadena, Cal.

Mr. Charles F. Lance, of London, lately in Egypt, is visiting New York.

Dr. Alfred Simon returned to London by *La Lorraine* on December 15.

Mr. J. L. Tonkin left London on December 16 to go to the Um Rus mine, in Egypt.

Mr. Richard A. Parker, of Denver, has returned there from a month's trip in Mexico.

Mr. C. W. Kempton, of New York, has returned from a professional trip to California.

Mr. C. C. Leavitt has resigned as superintendent of the Monumental mine, Waldo, Oregon.

Mr. A. W. Hare, of San Francisco, Cal., is at the Crown Deep mine, Johannesburg, South Africa.

Mr. Thomas Yerkes has returned from Philadelphia, Pa., to Santa Ana, Sonora, Mexico.

Mr. Geo. J. Bancroft has returned to Denver from an extended professional trip in southern Arizona.

Mr. H. H. Armstead, of Denver, was in New York and is now on his way to Butte, Montana.

Mr. Arthur S. Dwight, manager of the Greene Consolidated mines, is on a visit to New York.

Mr. T. Lane Carter, after an absence of six months in northern Rhodesia, has returned to Johannesburg.

Mr. S. W. Mudd, manager of the Queen Esther mine, of Mojave, Cal., was recently in San Francisco.

Mr. Arthur de W. Foote, manager of the North Star mine, California, has been visiting New York.

Mr. Wilbur E. Sanders has resigned the management of the Mogollon Gold & Copper Co., New Mexico.

Mr. C. James Gould has resigned as engineer to the San Finx mines and has returned from Spain to England.

Mr. W. H. Maury has succeeded Mr. R. M. Bibb as superintendent to the Virginia Iron, Coal & Coke Company.

Mr. Nicholas Samwell, having received an appointment, is now on his way from London to Mandalay, in Burma.

Mr. J. M. McClane is installing a Blake electrical separating plant for the Montana Zinc Co., at Butte, Montana.

Mr. A. F. Keer has accepted a position as assistant engineer for the Killen, Warner, Stewart Co., of Sumpter, Oregon.

Mr. Richard Y. Glassner, formerly at the Portland mine at Cripple Creek, Colo., has gone to British Guiana, South America.

Mr. C. J. Johnson has returned to Spokane, Wash., after examining the Scandia tunnel and the Climax group in eastern Oregon.

Mr. J. T. Gribble, formerly superintendent of the Reward mine, at Grass Valley, Cal., has gone to Luzon, in the Philippine Islands.

Mr. S. H. Lucas has resigned as superintendent of the Cuyamaca Mining Co., Cuyamaca, San Diego county, Cal., and is now at San Diego.

Mr. James Harrington, manager of the Wilkes-Barre Mining & Milling Co. at Central City, Colo., has returned from a visit at Wilkes-Barre, Pa.

Mr. Francis L. Robbins, president of the Pittsburg Coal Co., attended the annual meeting of the National Civic Federation in New York, December 15.

Mr. Woolsey McA. Johnson, of La Harpe, Kan., has been in New York during the week. He has resigned as assistant metallurgist to the Lanyon Zinc Company.

Mr. H. P. Jones has resigned as general manager to the Pittsburg-Buffalo Coal Co., and has become president of the Big Hill Coal Co., of Richmond, Ky.

Mr. A. S. McAllister, of Sibley College of Cornell University, has resigned to become a member of the editorial staff of the *Electrical World and Engineer.*

Mr. George D. Potter, manager of the Queen-Dominion and Blue Bird mines, in the Slocan district of British Columbia, has resigned the management of the former.

Mr. J. N. McBride, general manager of the Copper Glance Mining Co., at Cashin, Montrose county, Colorado, was recently in Denver to purchase new machinery for the smelter.

Mr. J. C. Brooks has resigned as superintendent of the Grenadena mine at Santa Barbara, Cal., to take a similar position at Avino, Durango, with the English company of that name.

Mr. Elmer Z. Burns, of the firm of Simonds & Wainwright, of New York City, has returned from a two months' trip to Colorado, where he has been making examinations of mining properties.

Mr. Thomas J. Hurley has been re-elected managing director to the Mine Securities Co. for the ensuing year, and Mr. T. Jay Hurley, superintendent of mines, with headquarters at Silverton, Colorado.

Mr. Anthony J. McMillan, general manager of Le Roi Mining Co., Ltd., has gone to England to attend the annual meeting of shareholders of the company, to be held in London early in February.

Messrs. Forbes Rickard and A. B. Frenzel of Denver, returned recently from a trip to Arizona and New Mexico, where they examined some rare mineral deposits and lead carbonate properties.

Mr. W. H. Lee, mine manager of the Van Anda mines, Texada island, B. C., has been appointed attorney in that province for the Puget Sound Iron Co., owning iron properties on Texada island.

Dr. R. S. Woodward, dean of the School of Pure Science at Columbia University, has been elected president of the Carnegie Institution at Washington, D. C., to succeed Dr. D. C. Gilman, who has resigned.

Mr. Henry J. Mills has resigned his position with the American Madoc Mining Co., at Madoc, Ont. He will spend a few weeks in New York and then leave to take a position with the San Carlos Copper Co., in Mexico.

Mr. Paul S. Couldrey, who early last month retired from the managership of Le Roi No. 2 mines, at Rossland, B. C., has gone to Australia, where he will have charge of important mining interests. Mr. Ernest Levy has succeeded him.

Mr. and Mrs. E. G. Stoiber, formerly of Colorado, were recently in a bad automobile accident in France, which resulted in a broken ankle for Mr. Stoiber, his wife escaping unhurt. The machine was overturned and a friend with them was killed.

Mr. Wm. C. Ralston, formerly president of the California Miners' Association and manager to the Melones Mining Co., of Calaveras county, Cal., has been elected president of the Fulton Iron Works, of San Francisco, in place of Mr. D. B. Hinckley, resigned because of ill health.

Mr. William Thompson, until recently manager of the Rossland-Kootenay and Velvet-Portland mines, after five or six years' active connection with mines in that camp has left Rossland for Ocampo, Chihuahua, Mex., where he will be general manager for the Waterson Gold Mines, Ltd.

OBITUARY.

William Spencer, one of the first men to develop bituminous coal mining in West Virginia, died at Vivian, West Virginia, December 13, aged 72 years.

SOCIETIES AND TECHNICAL SCHOOLS.

Colorado School of Mines.—The annual catalogue of this institution at Golden gives a total enrollment of 290 students.

TRADE CATALOGUES.

The Goodsell Packing Co., of Chicago, has prepared a compact little catalogue of its well-known packing.

The monthly bargain sheet for November issued by the Gregory Electric Co., of Chicago, contains a full list of the machines on hand in the company's warehouses.

A catalogue of the water tanks, camp wagons, engines, boilers and drills for prospectors is issued by the Cyclone Drilling Machine Co., of Orrville, Ohio.

A handsome and attractive publication is catalogue No. 35, issued by the Sullivan Machinery Co., of Chicago. It includes descriptions with excellent illustrations of the air compressors made by this company.

Catalogue No. 2, of the Vulcan Iron Works, of San Francisco, is devoted to a description of the Vulcan ammonia fittings and valves which are a well-known product of this company.

We have received from the Hammond Iron Works, of Warren, Pa., a neat and convenient scale of the dimensions and specifications for tankage. It is made of celluloid and is convenient to carry in the pocket.

The Litchfield Foundry and Machine Co., of Litchfield, Ill., is sending out a handsome and artistic booklet containing pictures of its hoisting engines, haulage engines, stationary engines and bicycle style sheave wheels.

The Westinghouse Machine Co., of East Pittsburg, Pa., is sending out a handsomely illustrated book with the suggestive title, 'A Few Words About Mechanical Stokers.' It is devoted chiefly to a description of the Roney mechanical stoker made by this company.

In catalogue No. 30 the Jeffrey Manufacturing Co., of Columbus, Ohio, describes some of its latest designs in crushers, pulverizers, hammers and other mining machinery, for which this company has a widespread and favorable reputation.

The Deane Steam Pump Co., of Holyoke, Mass., is distributing a new catalogue on condensers, No. d. 23. It reviews the principles and advantages of its several types of condensers as applied to steam engines, including surface and jet condensers, and discusses vacuum pumps, exhausters, air and circulating pumps and other auxiliaries.

INDUSTRIAL.

The Colorado Iron Works Co., of Denver, Colo., reports the following orders filled: two impact screens to the Puzzle Mining & Leasing Co., in Colorado; two impact screens to the Braden Copper Co., Chile, South America, and sampler to the Consolidated Mercur Mining Co., at Mercur, Utah.

The Burt Manufacturing Co. recently made a shipment to the United States Steel Corporation of its oil filters and exhaust heads, which makes 151 oil filters and 70 exhaust heads which have been supplied to this corporation by the company. They have also recently sent three oil filters with automatic water separator attachments, to the Penn Iron Co., Lancaster, Pa.

The Chicago House Wrecking Co., of Chicago, has purchased the entire property of the World's Fair at St. Louis. This is undoubtedly the largest dismantling operation ever undertaken. The purchase includes even plants and shrubs. Over 1,000 men will be employed in the dismantling, and fully 10,000 carloads will be required to move the material, which includes almost every manufactured article on exhibition.

Messrs. A. B. Frenzel, of Denver and J. W. Richards, of Denver, have lately brought out a

practical process for the treatment of low-grade uranium ores found in Colorado and Utah. Ores running as low as one per cent uranium oxide can be treated at a profit at points distant from the railroad. The product carries approximately 50 per cent of U_3O_8. Several tons of low-grade ore are now being treated at Mr. Frenzel's laboratory under conditions governing the practice where fuel, water and transportation are expensive.

The S. S. Machinery Co., the Thos. Crow Machinery Co., the Machinery Supply & Implement Co. and the Colorado Iron & Metal Yard Co., at Denver, Colo., will consolidate into the Second-Hand Machinery Co. on January 1, with the following officers: Henry Stewart, president and treasurer; Thomas Crow, vice-president and superintendent; D. B. McInerny, general manager, and M. H. Block, secretary. The new company has leased the Creswell building at Denver, where the machinery of the different companies will be installed at once.

The Northern Electrical Manufacturing Co., Madison, Wis., recently received an order for three 150-k.w. slow-speed generators from the Tennessee Coal, Iron & Railroad Co., of Birmingham, Ala. The order was received through J. B. McClary & Co., representing the Northern Electrical Manufacturing Co. at Birmingham. The Tennessee Coal, Iron & Railroad Co. is the largest of its kind in the South, and the order was secured in competition with all the first-class manufacturing companies. It was awarded after thorough examination and careful consideration of Northern machinery and given on the basis of superiority.

The Fulton Iron Works, one of the oldest manufacturing establishments in San Francisco, having been started early in the 50's under the firm name of Hinckley, Spiers & Hayes, has an extensive plant on the bay shore in the northern part of the city, toward the Golden Gate, where there are special facilities for shipbuilding, and where 300 employees are kept at work. It is understood that there will be an increase in the size of the plant shortly. W. C. Ralston, who has been connected with the mining industry since boyhood and is well and favorably known to the community throughout the State, has been elected president. He has quite recently made a report on the Tonopah and Goldfield districts, Nevada, to the San Francisco Stock and Exchange Board, at its request. The Fulton Iron Works has already been noted for its mining machinery work, and this branch will be still further extended through the efforts of the new president.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

Paradise.—At the Chiricahua Development Co.'s property work is progressing favorably. The shaft has been sunk to a depth of 380 ft. at the main workings, and at this shaft sinking has been through lime heavily mineralized with iron pyrites, and for the last 25 ft., just before cutting into the granite, the iron carried copper sulphides. At the Mars shaft of this property a depth of 350 ft. has been reached, and it is still in ore which is largely a chalcopyrite and iron pyrite with lime as a base.

At the Leadville the production continues at four carloads per month. The company reports such a decrease (although the value of the ore is the same) in price and treatment allowed on the last few carloads from what they received from the first few shipments that they have stopped shipping to El Paso, and are now shipping to the new lead smelter at Deming, N. M., with much better results.

At the Cochise Consolidated Copper Co., east of Paradise, work is progressing very satisfactorily, and ore is being accumulated preparatory to beginning regular shipments on the first of the new year. The company has opened a general store at its camp and has increased its force from, as last reported, 6 men to now 20, and as fast as possible will increase to their regular force of 45 men.

S. S. Badger, who had the bond on the Rieder group of claims, has sold the property to a Michigan syndicate. The first payment has been made, and work will be started by the first of the year.

Tombstone.—This camp is almost entirely a one-mine camp. The Tombstone Consolidated Mines Co. has consolidated all the principal mines in the district. This company is paying very little attention to shipments while developing and blocking out its ore and ground. The work is reported as progressing most satisfactorily, even to the exhaustive tests being made toward the cyanidation of the low-grade ores which the company has in large quantities. Upon this test rests the question of the erection of a large mill for this purpose.

The Lucksure Mining Co. has a property about one-half mile southwest of the Consolidated shaft, and is on one of the parallel ore lenses of the district. It is a Chicago company and is in charge of Mr. Shaw, the superintendent. The vein that they are working trends northeast and southwest, with a dip into the hill of about 20 degrees from the perpendicular to the southeast. The vein is a lime quartz heavily mineralized with an average of about 25 per cent of manganese, which carries from 3 to 30 oz. silver. It is a commercial ore, and the company is shipping three carloads per week. The mine is equipped with a complete new plant, the hoisting engine being a double 8 by 10 slide-valve geared hoist with a single drum. The shaft is an incline, one compartment, and is about 200 ft. deep. The company has lately bonded the Old Guard property, which adjoins the Lucksure on the north. It will operate this claim in connection with its own property. The Old Guard is one of the old-time mines of the camp. It was operated in the early days by an English company, but owing to the high prices of all materials, freight, etc., at that time it did not pay, and was finally sold to local parties under attachments. It is on the same vein as the Lucksure, and with the now cheapened condition of everything, including the cost of smelting, a railroad into the town and low freights, the ore is commercial. The claim is equipped with an old-fashioned, long stroke, slide-valve engine that operates the hoist. The workings are at a depth of 200 ft., and there has been some drifting done, but to no great extent.

Eastern parties are now negotiating for the old Bunker Hill group, which lies about one mile to the east of the Consolidated company.

CALIFORNIA.

AMADOR COUNTY.

Amador Queen.—This mine is 1½ miles from Jackson, in the vicinity of the Kennedy and Gwinn mines. It is under the management of R. S. Green. The following shows the result of sampling and testing the ore: Sample of 158 lb., 20 oz. silver, 103 oz. gold; 63 lb., 10 oz. silver, 63 oz. gold; 263 lb., 11 oz. silver, 39.3 oz. gold.

Argonaut Mining Co.—The 40-stamp mill at this property, at Jackson, idle for some years during litigation, is being put in running order. Since the suit was decided in favor of the company shaft sinking has been continued to a depth of 2,580 ft., and several orebodies have been opened on the lower levels. About 2,000 tons of ore are on the dumps. In a few weeks the mine will be again producing.

CALAVERAS COUNTY.

California Placer Mining Co.—Very rich gravel is being taken from the new shaft of the Marshall mine of this company.

Hagerman.—D. P. Gray is putting up a shaft house and machinery on this mine, on the Calaveras river, near San Andreas.

Johnson.—It is understood that D. Fricot, who owns this gravel claim, next to the Hedrick, on the San Andreas channel, will open it up next month.

O'Connell Blue Gravel Mining Co.—This is a new corporation, owning 60 acres of ground on the San Andreas gravel channel, and is the sixth company intending to develop it. The directors are A. J. McSorley, G. Tiscornia, G. C. Graves, Wm. Casey, Jr., and Daniel Kevane. Mr. Casey is the secretary, with offices at San Andreas.

EL DORADO COUNTY.

Ida Mitchell Mining Co.—At the 500-ft. level a station has been opened, at which depth all the veins passing through the property will be prospected.

INYO COUNTY.

Virginia.—J. D. Hubbard, of Chicago, has purchased this group of mines, in Kearsarge district, and has begun extensive development work.

NEVADA COUNTY.

Buckeye.—The drain tunnel at this mine, near Nevada City, has cut the main vein at a distance of 600 ft. from the face of the hill.

Central Consolidated Mining Co.—Negotiations are under way by C. A. Bailey, principal owner of this mine, for the purchase of a 20-stamp mill.

Murchie Mining Co.—J. C. Campbell, the new superintendent of this property, in Grass Valley district, has formulated plans for more extensive development work. Among other things, the shaft is to be deepened 200 ft.

PLACER COUNTY.

Dairy Farm.—This mine is situated half way between Sacramento and Marysville, seven miles off the main line of the Southern Pacific. It belongs to L. C. Trent and associates, who have expended $90,000 in developing and equipping the property, and within the last few months have shipped 10,000 tons of ore to the Peyton Chemical Works, at Martinez, Cal. This ore has been running 40 per cent iron, 48 per cent sulphur, 3½ per cent copper, with good values in gold and silver. A heavy body of this sulphide ore was encountered at 200 ft. depth. The surface ores carry free gold, and this is being milled by Chilean grinders and amalgamating plates, and they are now preparing to cyanide the tailing.

Golden West.—In this mine, Canada Hill district, Forest Hill Divide, the gravel channel has been reached and pay struck. They have been two years and a half running the tunnel to reach the channel. C. H. Armstrong is manager.

SHASTA COUNTY.

Phoenix Mining Co.—This company is preparing for extensive development of the Summit group, near Kennett.

SISKIYOU COUNTY.

Gold Dike Mining Co.—This company, at Cecilville, is finishing the installation of its new mill, and will shortly have it in running order.

Last Chance.—A. D. Cameron, of Seattle, has found the ledge in this mine, at Oro Fino, which was apparently lost by the original owners a few years ago.

SONOMA COUNTY.

Culver-Baer.—This quicksilver mine has now 19 men at work and is shipping regularly, with only one of the two furnaces at work.

Graphite.—The Skinner graphite mine, near Petaluma, has been sold to S. H. Rice and Mr. Leach, and will now be worked more extensively.

Socrates Quicksilver Mining Co.—This company, at Pine Flat, is shipping an average of 200 flasks of mercury per month.

TRINITY COUNTY.

Quimby.—One-fourth interest in this property was recently sold by W. R. Beall to A. B. Hammond, of San Francisco. The other interested parties are W. A. Merralls, J. A. Brent and J. W. Heisner. The property is considerably developed by adits, giving 1,000 ft. vertically of stoping ground. The ore is gold-bearing, and the gold recovery may be made by amalgamation.

TUOLUMNE COUNTY.

California Marble & Construction Co.—Mr. Grant has sold to the company 160 acres of marble land, and the quarry will be equipped next month for active operations.

Eagle Shawmut Mining Co.—This company, at Chinese, is now employing 250 men, and the mill is kept steadily at work.

Green Jumper.—A number of men have been put on development work in this mine, under supervision of William Conn.

Tansy.—This pocket claim, at Sonora, owned by J. B. Oneto, and operated by him and John O'Hara, yielded $5,000 as a partial clean-up recently. The last pocket found has yielded thus far $9,000.

Lewis.—This pocket mine, on Bald mountain, operated by Wm. Lewis, Geo. Overholser and Mr. Connors, yielded $10,000 in gold in one week lately.

COLORADO.

BOULDER COUNTY.

Globe Mining Co.—This company, operating the Smuggler property in the Jimtown district, is reported to have made a rich strike in the 200 ft. workings. There is a wide body of a good grade ore alongside of which there is a three-inch streak of sylvanite and tellurium. E. G. Pryce, Boulder, Colo., is manager.

CLEAR CREEK COUNTY.

Ore Shipments.—For November shipments from Idaho Springs station to the smelters showed a total of 188 cars, or an increase of about 75 per cent over the corresponding month of last year.

Bonieta Mill.—F. F. Reed of Idaho Springs has taken a lease on the dump of the Saratoga mine in Russell district, and the mill is to be run exclusively on ores from that property. The mill has been remodeled, ten stamps being for amalgamation and fifteen for regrinding for the concentrating section.

Stanley.—This large group of mining properties near Idaho Springs is being improved and equipped in a general manner, which suggests heavy future plans of the new owners, the improvements being both on surface and underground. A. D. Gehrmann, Idaho Springs, Colo., is superintendent, but the plan of operations will not be disclosed for the time being.

Sun and Moon.—Cleveland parties are owners; during the past month the daily product was over 60 tons of milling ores and 15 cars of smelting ores, which product is to be increased at least 25 per cent. Sinking operations are still in effect, the 1,100 ft. point having been passed, and a large amount of ground is being opened up, making large ore reserves. R. C. Bonney, Idaho Springs, Colo., is manager, and about 75 men are employed.

GILPIN COUNTY.

Big Revenue Mining & Milling Co.—This company has taken a lease and bond on the Homestake mine in Russell gulch, and machinery is being installed for deeper operations. J. D. Williamson, Idaho Springs, Colo., is manager.

Bullion Mining & Milling Co.—Illinois and Iowa parties have become interested in the Loyal group in Lake and Enterprise districts, and they are opening the group through tunnel workings, and figure on installing machinery. They have shipped ores to sampling works, giving values up to $175.00 per ton, principally in silver and lead. Tracey Hall is manager.

Foote & Simmons.—Denver parties have started up this property under lease and bond, and have overhauled the machinery and put the property in working shape. They will carry on liberal developments. The property has produced some very fine grade smelting and milling ores, the latter running very high in values. E. W. Williams, Denver, Colo., is lessee.

Hawley-Gardner.—Local lessees operating this property on Quartz hill, made a shipment of two loads of first-class iron which netted them $126.70 per ton, their milling ores running 2½ ounces gold per cord and their tailing selling for $25.00 per ton. Ores are coming from the 718 ft. level, the property being idle for a number of years. W. Nicholas, Central City, is in charge of operations.

Maine.—Kentucky parties have purchased an interest in this property in Gregory district, consideration being $7,000, and they are busy installing compressors and new machinery for heavier operations. The property is credited with producing very high-grade smelting ores, and the management is in the hands of W. M. Lynn, Central City.

Old Town Mining Co.—This company, operating the Old Town property in Russell gulch, will pay a dividend of $15,000 as a holiday present to its stockholders. The stock is owned by Colorado and New York City parties. George K. Kimball, Jr., of Idaho Springs, is general manager.

Golden Rod Gold Mining & Milling Company.—Illinois parties are interested in the Pet group, operated by this company in Silver Creek, and a trial shipment sent to sampling works during the past week brought net returns of $96 per ton. The ores came from the shaft, and sinking is being carried on with air drills. John Lillig, Black Hawk, Colo., is manager.

Perigo or Independent District.—An active winter season is apparent, and an increased working force is being employed. The Gold Dirt Mining Company, with J. R. Anderson, manager, at Rollinsville, Colo., has started to sink its main, or Gold Dirt shaft, and also its War Eagle shaft, has a force of men grading out for boarding and office buildings, and has graded out for a new mill, to have a daily capacity of 100 tons and to be of the cyanide process, which has been found to be the proper treatment by careful tests made for several months past on the Gold Dirt ores. An additional number of leasers have gone to work at the Perigo property, and the output is increasing. The Perigo mill is running on ores from the Perigo, Gold Dirt and Mountain Chief, the last run in ores from the last-named property cleaning up 2½ oz. gold per cord, the gold selling for $19.13 per ounce.

Flack.—Harry & Company, of Bald Mountain, shipped surface ores from this claim, on Quartz hill, west of the California mine, which brought them returns of 11 oz. gold per cord. Denver parties are owners.

Spur Daisy.—This property, on Negro hill, Eureka district, is owned by Cleveland parties, and is being worked by McGinnis & Company, of Central City, under a lease. From the upper workings they are taking out smelting ores running 18 oz. gold per ton, and the mill ores have ranged from 8 to 14 oz. gold per cord.

United Mining Co.—St. Joseph (Mo.) parties are interested in articles of incorporation filed by this company, with capital stock of $10,000, divided into 10,000 shares of par value, and one of the smallest incorporations ever filed in this county for mining purposes. The incorporators are E. W. and Carl Dienger, George Carlons and Louis Eberhardt, and they will operate in the Central mining district.

LAKE COUNTY—LEADVILLE.

Bessie Wilgus.—From the conditions found in this property it is evident that the ore must be looked for in the lime, and to this end several shafts are being run from the bottom of the shaft, 400 ft. The principal drift is being driven towards the Reindeer.

Coronado.—The work of opening the body of ore continues, and as headway is made the ground overhead is being drained. It will take some time for this to be done so that stoping can be started, as the pumps are raising 1,100 gal. of water per minute.

Ida May.—During the week, while sinking the shaft on this claim, a body of ore 18 in. wide was opened. It runs a fraction less than 1 oz. gold and 16 oz. silver per ton. The ore was found at a depth of 50 ft., and it is a fissure vein. Sinking will be continued to ascertain the extent of the orebody.

Little Sister.—The drill on this claim, lower Rock hill, has penetrated 125 ft. of a mineralized zone. The formation is a silicious magnesium lime, and all of it carries some values. The drill has struck bunches of mineral carrying gold, silver, copper, iron and lead. The hole is now a little over 1,000 ft., and will be sent to the Cambrian quartzite. The United Mining & Development Co., which has a lease on the ground, will shortly after the first of the year sink a shaft between the Mike and the Little Sister to open the orebodies. The result of this drill work in this section is most important to Leadville, as it opens a district containing thousands of acres for future development.

Mountain Lion.—A tunnel is being driven to cut the veins from the east, and 8 ft. of porphyry highly mineralized has been passed through. The lessees will crosscut and sink winzes in this mass to find a solid body of mineral.

Penrose.—At the 750-ft. level a station is being cut to accommodate one of the large pumps, and while this work is going on sinking has ceased. The pump will be in place early next week, when sinking will be resumed.

Sunday.—The owners have taken charge of the mine and are timbering the shaft, erecting new surface buildings and installing an up-to-date plant of machinery. It is the intention of the owners to sink the shaft deeper and at the same time continue the development work where the ore was encountered at the 125-ft. level. The present depth of the shaft is 300 ft., and another drift will be started at the 200-ft. level.

OURAY COUNTY.

San Pedro Gold Mining Co.—This company's property consists of 47 lode claims, five mill-sites and one placer claim, between the Camp Bird and Revenue-Virginius mines at Ouray. Twenty-six of the San Pedro claims are now undergoing patent, and the balance of the claims will be patented early next summer. The company owns these claims outright, there being no money due on purchase price. At present there is about 1,800 ft. of tunneling on the various claims, of which 957 ft. is in the main cross-cut tunnel now being driven. The board of directors consists of the following: F. S. Mallory, New York City; C. H. Trimble, Memphis, Tenn.; Frederick Tench, New York City; Charles B. Burt, New York City; H. R. Boyd, Memphis, Tenn.; Edward F. Terry and James Hayward, St. Louis, Mo.; L. A. May, New York City, and Fred W. Hebard, Philadelphia, Pa. Terry & Tench, contractors, of New York, have taken a contract to drive one mile of tunneling and equip the property.

TELLER COUNTY—CRIPPLE CREEK.

Acacia Gold Mining Co.—At the annual meeting of the stockholders of this company the following directors were elected for the ensuing year: J. E. Hundley, K. McKenzie, M. S. Robinson and G. A. Duer. A vote of thanks was tendered the board of directors for the past year. The past has not been very profitable for the company, owing somewhat to the labor troubles. The operations on the property consisted entirely of work done by lessees. A dividend of one per cent per share was declared, amounting to a little over $14,000. The property of the company is situated on Bull hill.

Free Coinage Gold Mining Co.—The annual meeting of the stockholders of this company will be held in a day or two. A number of the prominent stockholders of the company are in town to attend it. The stock of the company is principally held by the estate of the late Sam Strong. The property is situated on Bull hill and has produced a large amount of ore. At present the property is being worked by lessees.

Golden Wedge.—A new boiler and a compressor are being installed on this property. The shaft is to be sunk to a greater depth and considerable development work is to be done. A good deal of good ore has been taken out of this property. The property is being worked under bond and lease by Josiah Winchester and associates.

Cripple Creek Enterprise Gold Mining Co.—This property, which is situated in the city of Cripple Creek and has been working recently, has closed down, the reason for this not being given. The property has not been worked for some time until recently.

El Paso Gold Mining Co.—This company recently purchased the Morning Star property, which is situated on Beacon hill, adjoining the property of this company. The price paid was a good round sum. The El Paso has been steadily acquiring property on this, until at present it owns a large acreage.

IDAHO.

IDAHO COUNTY.

Empress Mining & Milling Co.—At this company's property, near Roosevelt, a tunnel 200 ft. long has been driven into the mountain and a gold-carrying contract is reported.

Nachusa.—Ore is reported struck on this claim at Thunder Mountain.

Cora D.—A ledge is reported opened on this property at Dixie that averages $8 per ton. C. E. Hayden is the owner.

SHOSHONE COUNTY.

Cooney-Murphy-Kelly.—John M. Burke is reported to have bonded these groups at Wallace. They join the Tiger-Poorman on the east. The price is reported to be about $100,000 for each claim. The Murphy-Kelly group consists of the Marsh, the William Sulzer, the Lentz, the Jett and the Slayton claims, which are on the north side of O'Neil gulch. All are surveyed for patent. The owners are, Frank Murphy, Mark Cooney, John Kelly and Mr. Lambert.

INDIANA.

Secretary Penna, of the Indiana Coal Operators' Association, with headquarters in Terre Haute, says that in 20 years' experience he does not recall a winter when the outlook for the coal business was as discouraging as now. The opening of new mines in Indiana and other States in the last few years has resulted in an oversupply, and many operators would prefer that their money was invested even at two per cent to having it in the mines at present. The market may be stimulated somewhat on account of the November rise in the Ohio river, which prevented the arrival of coal by the coal fleet. This will create a shortage of millions of bushels, or at least the vast amount usually floated down the river. Indiana coal business will profit by this shortage.

Three of the seven boilers of a mine owned by the Park County Coal Co., near Rosedale, exploded on the 13th inst., John Dorman, the engineer, was blown through the roof of the engine-room and died in a few hours. The fireman was struck by some flying timbers and seriously injured. The tipple of the mine is an entire wreck. The damage will amount to $8,000.

CLAY COUNTY.

Domestic Block Coal Co.—This company, recently incorporated with a capital of $50,000, has removed its office from Kokomo to Brazil. A 4-ft. vein of block coal has been found by the company on its leased land of 1,500 acres in the sinking of the first shaft. Other shafts will be sunk at once and the output be shipped to the manufacturers in the gas belt.

MICHIGAN.

COPPER—ONTONAGON COUNTY.

A railroad to be known as the Ontonagon & Southwestern, is projected, which will give the Porcupine mountains an opportunity for development. It extends from the village of Ontonagon to the Presque Isle river, just over the line to Gogebic county. The survey has been completed and the construction is actually in hand. It is calculated that 11 or 12 miles will be completed during the present winter.

The road will pass within a mile or so of the Nonesuch mine, which is the best known of developments in the Porcupine mountains. It has been idle for many years. The only successful operation that it ever underwent was during a period when it was held on lease by Captain Thomas Hooper, at present superintendent of the Victoria mine. He operated it for a considerable period and made a profit of his work.

MONTANA.

GRANITE COUNTY.

Mammoth.—Active operations have begun at this mine near Garnet, which has been idle for some years. There is a 10-stamp mill on the property. The mine is owned by S. E. Larabee of Deerlodge.

LEWIS AND CLARKE COUNTY.

Park.—These mines in the Elkhorn mountains, 30 miles east of Helena, have been bonded to a syndicate headed by A. C. Mason, of Tacoma, for a reported price of $50,000.

MADISON COUNTY.

Black Hawk Mining Co.—A 10-stamp mill is being erected on this company's property near Norris. It will be ready by February 1.

SILVER BOW COUNTY.

Eva May.—This mine in the Cataract district, is to be again operated. J. Hume is manager.

NEVADA.

LINCOLN COUNTY.

Las Vegas.—This place is in a sink or wash, 460 miles southwest of Salt Lake City, Utah, on the San Pedro, Los Angeles & Salt Lake railroad. The railroad lacks 25 or 30 miles of being completed. The lands here, and near, are owned by the railroad company, and building is not yet permitted on the townsite. It is 24 miles west of the big bend of the Colorado river.

Bull Frog is 120 miles eastward. It is reached by wagon road, with no mountain range to cross. Many prospectors are leaving for that mining camp. No prospectors are as yet returning, which is encouraging. Between Las Vegas and Bull Frog mineral locations are being made. Many fine timber claims are being located on the road.

Searchlight is about 70 miles south from Las Vegas by wagon road, and when the railroad is completed can be reached from a point further south in about 30 miles of wagon travel. Searchlight is about 12 miles west of the Colorado river. El Dorado Cañon, which has had some excitement for its gold prospects, is in T. 26 S., R. 65 E., M.D.M., about 50 miles by wagon road. On the Colorado river, the Wall Street mine, with a large record of gold production, is within easy distance. The Muddy Range, to the east, between here and the Virgin river, has some excellent prospects.

The region to the north, west, south and east is reported as mineralized, and many prospectors are exploring.

There is a valley, containing two to three hundred thousand acres of bottom and mesa, level enough to irrigate, and it is likely to make a central location for this vast mining region. On the ranches are now grown alfalfa, apples, peaches, figs, sweet potatoes, grapes, etc. Water is the important question. On the mesa a well at 6 ft. struck water; at 9 ft. the diggers had to quit on account of the volume of water. Over the mesa and bottom is sage brush and grass in bunches and patches, indicating the nearness of water to the surface. The mesa is 10 to 20 ft. above the bottom. On the break between are many damp spots and water seeping out.

In prospecting, supplies for man and beast must be carried. In mining, nearness of rail and cost of supplies affect the expense and maintenance. A mine oftentimes is made payable by its location. The 40- to 50-ft. vein of $29 gold ore, reported from Bull Frog, must have economical management to make its operation profitable. The bodies of iron, manganese, salt, gypsum and other commercial products will become valuable as conditions improve.

NYE COUNTY.

Butte-Goldfield Co.—W. W. Wishon, W. A. Stevens, S. J. Gormley and associates of Butte, Montana, have organized the Butte-Goldfield Mining & Reduction Co., which purposes developing properties in Nye and Elko counties, Nevada. At present the company controls the Hercules group of five claims at Goldfield, five copper claims near Sodaville and a third group of copper claims in Elko county. It is the intention of the company to develop the copper near Sodaville and use its ores as a medium for collecting the gold in Goldfield ores. The Sodaville ores comprise, among other varieties, a black oxide of copper, accompanied by silver. It is said to run about 16 per cent copper. A reduction plant at Sodaville is a possibility of the future.

OREGON.

BAKER COUTY.

Weatherby.—This group of placer mines on Chicken creek, have been sold to G. F. Frey for a reported price of $22,000.

JOSEPHINE COUNTY.

Opp.—A 40-stamp mill is contemplated for this mine near Jacksonville. Ten stamps are now dropping.

LINN COUNTY.

A new mining camp has been established in this county, between Sweet Home, on the Willamette Valley & Cascade Mountain wagon road, and Anidem, the mining town of the Quartzville district. It is eight miles from Anidem and is reached by the South Santiam route. Work is being done on several claims which were taken up by Seattle men a short time ago. Three men are now doing the preliminary development work at the mine, and have already run a 50-foot tunnel, meeting with good results. Considerable gold ore, which assays from $15 to $40 per ton, is reported to have been secured.

PENNSYLVANIA.

ANTHRACITE COAL.

Coal Brook.—The fire in this mine at Wilkes-Barre is unextinguished, and is reported to be spreading.

Mill Creek Coal Co.—The new breaker of this company at New Boston is nearing completion.

Philadelphia & Reading Coal & Iron Co.—A new 600-ton breaker is being installed at this company's Phoenix Park colliery, near Reading.

BITUMINOUS COAL.

Enterprise.—The fire at this mine at Shamokin is reported to be finally extinguished and an early resumption is expected.

Locust Run Coal Co.—The property of this company in Pool 3, including 232 acres of coal land, has been purchased for the Ohio & Youghiogheny Coal Co. at a reported price of $250,000.

New York Coal & Transportation Co.—The property of this company at Puritan has been sold on a suit brought by the Pressed Steel Car Co., of Pittsburg, for debt.

Pittsburg Coal & Fuel Co.—This company has been formed to take over the property of the Wahlville Coal Co., near Evans City. Extensive repairs and alterations will be made.

UTAH.

JUAB COUNTY.

Joe Bowers.—Improved physical conditions are reported in this property.

Mammoth.—This property is shipping regularly and has paid six dividends this year, which aggregate $120,000.

SALT LAKE COUNTY.

Bingham Consolidated Smelter.—Copper bullion shipments during the week ending December 17 aggregated about 241,000 pounds.

Dalton & Lark.—A seven-foot vein of ore opened on the 1,100-ft. level recently shows 9% copper and 80 oz. silver ore.

Utah Consolidated Smelter.—Shipments of copper bullion during the week ending December 17 aggregated 424,486 pounds.

United States Smelter.—Shipments of copper bullion during the week ending December 17 aggregated about 245,000 pounds.

WASHINGTON.

FERRY COUNTY.

Belcher.—The cross-cut on the No. 3 tunnel level has developed two feet of solid chalcopyrite on the foot-wall, which, the superintendent says, carries highest copper value of any ore ever before found in the mine or on Belcher mountain. The cross-cut for 10 ft. is in solid sulphide of iron ore of good payable values in gold and copper, that being in addition to the two feet on the foot-wall. The ore developed is at a depth of about 600 ft. below the apex of the vein and 1,000 ft. in from the portal of the tunnel. The president and directors of the company are expected in camp to inspect the new orebody, and consult with J. L. Harper, the manager, in regard to plans for operating the mine on a larger scale than heretofore.

Mountain Boy.—Superintendent Verrill reports that the average value of the ore mined for the week ending December 10 was $300 per ton. A car of ore now being loaded at Republic for transportation to the smelter is expected to reach a value close to $800.

FOREIGN MINING NEWS.

ASIA.

INDIA—MYSORE.

Kolar Goldfield.—The production reported for this field for the month of November was 51,664 oz. bullion, which is 426 oz. more than in October, but 352 oz. less than in November, 1903. For the 11 months ending November 30, the total production was 563,998 oz. bullion, against 545,603 oz. in the corresponding period of 1903, an increase of 18,395 oz. The bullion reported this year was equal to 507,598 oz. fine gold, or $10,492,051 in value.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—Shipments for the week ending December 10 were as follows, in tons: Granby, 11,834; Mother Lode, 3,136; Brooklyn-Stemwinder, 2,460; Emma, 957; Senator, 264; Oro Denoro, 66; Mountain Rose, 616. Total for week, 19,249 tons; total for year to date, 763,880 tons.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—Shipments for the week ending December 10, were as follows, in tons: Le Roi, 2,862; Centre Star, 1,320; Centre Star (milled), 450; War Eagle, 720; War Eagle (milled, 450; Le Roi No. 2, 330; Jumbo, 324; White Bear (milled), 30. Total for the week, 6,486; for the year, 228,697 tons.

MEXICO.

SONORA.

Rey del Oro Mining Co.—The reported sale of this company's property to the Greene Consolidated Copper Co. is erroneous; such a sale did not take place.

NEW CALEDONIA.

Shipments of ore from the colony, for the nine months ending September 30, are reported by the *Bulletin du Commerce*, of Noumea, as follows, in metric tons:

	September.	Nine months
Nickel ore	2,885	40,543
Cobalt	381	6,158
Chrome ore	5,653	29,762

The shipments of chrome ore this year are showing very considerable increases.

MINING STOCKS.

(Full quotations on pages 1015 and 1016.)

New York. Dec. 21.

The tame finale to the cross-play in last week's copper share speculation has been rather disappointing to some investors. Perhaps the new move to snuff the candle of publicity by indirect means will be equally unsatisfactory. Meantime investors in the shares that are under fire must bear the brunt of the battle. Why? Because the principals who are really responsible refuse to answer. Momentarily sales of Amalgamated are comparatively small, at $66.50@$68.375. Anaconda is invisible. Greene Consolidated hovers around $27, and Tennessee, which has just declared its third dividend of 5% was exchanged at $37.50@$38.50.

In the gold and silver stocks business is quiet, and the Comstocks are weaker.

Boston. Dec. 20.

(From Our Special Correspondent.)

This market has completely flattened out, and, except for a few specialties, is nothing but an ante-holiday market. Where brokers' offices were overflowing a few weeks ago, and clerks were working well into the night to handle customers' accounts, these same offices are now described, and only the habitués are on hand, making a complete transformation in two short weeks. It is now felt that the copper boom that was well under way has been sidetracked by the actions of Lawson. The Lawson-Greene episode did not bring the dire results threatened at one time, but did result in a steadier market for Greene Consolidated for a spell. The stock rose to $27.62½, although selling on a dull market knocked it off to $25 to-night.

As a rule, prices are higher than a week back, although there are some exceptions. Copper Range has fallen from $68.87½ to $64.50, and the street is a little sceptical about it, feeling that this is a vulnerable stock, should the Standard Oil people wish to attack Lawson in the market. Lawson's Trinity is also under the ban, having fallen from $11.87½ to $8.50 to-night. The president of this company could —if he would—explain why there are but two employees at the mine. As a matter of fact, the amount of ore now blocked out has got to be removed before any more work can be done in the mine. This will be remedied when plans are definitely settled for the building of a smelter. It is not generally known, but it is a fact that there is about $250,000 in the Trinity's treasury.

The declaration of the usual $1.50 Utah Consolidated dividend was a disappointment and caused the stock to sell off $1.50, to $41.75, although it recovered $1 of the decline. The company is said to be earning $6 per share a year. Osceola has varied from $92 to $93.25. The directors will meet next week, when $2 is expected to be declared, instead of the $3 talked of some time ago. Bingham advanced $2 to $35, during the week, and holds fairly strong. Centennial is off $1.25 net for the week, to $24.25, but Old Dominion is up $1.25, to $25.75. Mohawk has declined $1.50, to $49.75. Isle Royale advanced from $24.87½ to $26.75 on more favorable reports from the property. United States has varied from $25 to $24.25, with a fair volume of business. Allouez holds firm around $18. There has been quite a bit of activity in Montana Coal & Coke, at $5@$5.25, on the rumor of a new deal of some sort. Boston Consolidated settled to $6.12½ on limited trading. Amalgamated has made a net gain of $2.12½ for the week, closing at $67.87½.

Colorado Springs. Dec. 16.

(From Our Special Correspondent.)

The past week has been a very active one on the local mining exchange, but the prices of Cripple Creek stocks have not varied to any great extent.

Acacia has advanced from 7½ to 8½c. Cripple Creek Consolidated has dropped off 1c., selling to-day for 10c. El Paso remains around $1.16. Elkton has shaded off from 72 to 69c. Isabella has been very active, starting in the week at 29½ and running down to 24½ and recovering to 27c. Pharmacist has advanced from 3⅞ to 4¼c. Portland sold during the week for $1.80; Findley for 34c. Work has advanced from 12⅝ to 13⅞c. Vindicator has sold for 70c. per share.

Salt Lake City. Dec. 17.

(From Our Special Correspondent.)

This has been a good business week on the Mining Exchange. With a few exceptions, prices ruled fairly steady. Wabash advanced from 85c. to $2; the rise was due entirely to manipulation. Daly-West paid its usual monthly dividend of $72,000; but few shares transferred; those around $12.

The Silver King has announced an extra dividend of $100,000, which is payable December 28. Daly-Judge is considerably stronger, believed to be due to the steady improvement in development. Victoria of Tintic has announced its initial dividend of 3c. a share, or $7,500, payable next week. Yankee Consolidated ended the week stronger. A considerable demand for Lower Mammoth was noted during the week, due to a short account. New York Bonanza opened weak, but closed in much better tone. The development of the mine continues with gratifying results.

San Francisco. Dec. 15.

(From Our Special Correspondent.)

The Comstocks have been strong through the week, and there was a special movement in Ophir, owing to returns from the mine which are supposed to be favorable. That stock went up to $3.85; Consolidated California & Virginia sold at $1.90; Mexican at $1.40, and Hale & Norcross at $1.15.

The mining companies making reports show cash on hand December 1 as follows, according to sworn statements filed in their offices, with all expenses paid, unless otherwise noted: Alta, $486, with liabilities of $4,334; Alpha, $1,480; Andes, $2,355; Belcher, $5,299, with November expenses partly unpaid; Best & Belcher, $4,777; Bullion, $2,355; Caledonia, $7,792, with November expenses unpaid; Challar, $117; Confidence, $1,188, with November expenses unpaid; Consolidated California & Virginia, $1,949; Challenge Consolidated, $217; Crown Point, $7,768; Consolidated Imperial, $3,492; Exchequer, $3,756; Gould & Curry, $5,871, with bills receivable of $390; Hale & Norcross, $4,128; Justice, $1,178, with concentrates and amalgam to be realized; Julia Consolidated, $544; Mexican, $569; Overman, $1,708, with November expenses unpaid; Ophir, $44,602; Potosi, $4,730; Savage, $1,056; Sierra Nevada, $3,088; Silver Hill, $7,984; Segregated Belcher, $121; Scorpion, $1,234; Standard Consolidated, $45,598, with November mining expenses and November clean-up to be accounted for; Syndicate, $2,672; Union Consolidated, $2,805; Utah Consolidated, $23, with $2,500 due bank.

On the San Francisco & Tonopah exchange there was considerable activity, and prices were rather stronger. Some quotations noted are: Montana Tonopah, $1.70; Tonopah Belmont, 74c.; Bullfrog, 58c.; Sandstorm, 38c.; Tonopah Midway, 35c.; Tonopah North Star, 23c.; Red Top, 17c.; Blue Bull, 10c. per share.

On the California exchange trading in oil stocks was light, but there was not much recession in prices. Caribou sold at $5.75; Monte Cristo, 77c.; Home, 42c.; Sovereign, 30c. per share.

COAL TRADE REVIEW.

NEW YORK, Dec. 21.

ANTHRACITE.

The anthracite coal trade continues to show increased local demand, under the influence of continued cold weather. At the same time there has been some trouble about tidewater deliveries, owing to short supply of cars and interruptions on the railroads, due to snow and stormy weather. Production at the mines is being rushed this week, as the coal will be needed to meet demands during the holiday season, when all work is generally stopped for a week or so. Operators are trying to induce their men to make the holiday stop as short as possible.

The embargo on shipments to New England by all-rail is continued. The situation of affairs on the New York, New Haven & Hartford lines is quite serious, and freight seems to be tied up indefinitely. The reason for this embargo by the roads running to the Hudson river has been the long delay in getting cars returned.

To add to the difficulties in the New England trade, the coastwise traffic has been interrupted by storms. Quite a number of coal-loaded schooners are reported wrecked or damaged. This is especially the case with vessels bound for Cape Cod and beyond.

In Chicago and other western territory the demand has been improved by the cold weather, but there is delay in shipments and deliveries of coal, owing to short supply of cars, and snow on the railroads.

New York harbor trade is steady, the only change being an icreased demand for steam sizes, which tends to improve the market. Prices continue unchanged. For domestic sizes, the schedule price, which is strictly adhered to, is $4.75 for broken, and $5 for egg, stove and chestnut, New York harbor delivery. For steam sizes, quotations are about $3 for pea coal, $2.25@$2.50 for buckwheat, $1.45@$1.50 for rice, and $1.30@$1.35 for barley.

There is nothing new with regard to the Lehigh Coal & Navigation deal. While insiders refuse to give out anything definite, the general belief is that the deal has been headed off by certain parties, who did not wish to see the control of this important property pass to the New Haven Co., or to any outside corporation.

BITUMINOUS.

The Atlantic seaboard soft coal trade shows a heavy demand, a very short supply, and advancing prices. In New England the scarcity of water for power has created more demand for coal. The car supply in the last two weeks has been dwindling on all the roads, and the recent heavy weather has interferred with

traffic. At the mines the car supply is practically nil, and coal in transit is stalled to some extent. Frost has also stimulated the demand for coal, with the result that prices on the lowest grades are now $2.75@$3, and we hear that the ordinary steam coals are quoted at $3@3.50, f. o. b. New York harbor shipping ports, although none is to be had.

Trade in the far East is calling for considerable coal, notwithstanding the fact that supplies had been laid in early in the summer when deliveries could be made freely. Along the Sound business is very active, but only small quantities of coal can be had. At New York harbor requests are urgent.

The car supply is very bad, and most shippers claim they are not getting 25% of their demands.

In the coastwise market vessels are in pretty good supply, but lack of coal has made the demand small. From Philadelphia rates are 70c. to Boston, Salem and Portland; 75c. to Portsmouth and Bath; 60c. to Providence, New Bedford and the Sound.

In Ohio and West Virginia, and also over a considerable part of Pennsylvania, the coal trade continues to be seriously embarrassed by the drought. A good deal of snow has fallen recently, but, as the temperature continues below freezing point, it has not melted, and the water supply continues very low. At a number of mines operations are difficult, as no water is to be had for the boilers, and on the railroads the trouble is serious. On some lines a number of locomotives have had to be laid up, although there is abundant work for them to do; and on others it has been necessary to carry water for considerable distances in tank cars, owing to deficiencies in local supply. Only a general thaw can relieve the existing conditions.

The continued low water in the Ohio and Mississippi rivers has reduced the supply of coal in many towns along the rivers almost to a famine point. The quantity of coal tied up at Pittsburg is very large.

Birmingham. Dec. 19.

(From Our Special Correspondent.)

The coal production in Alabama is still healthy, despite the continuation of the union miners' strike. There is demand for every ton of coal that can be mined, and shipments out of the State are heavy. The car situation is better than it has been for some time. The completion of the Seaboard Air Line railroad into Birmingham from Atlanta, Ga., will go a good way towards relieving the situation in regard to cars. That line is getting considerable of its fuel from this district, while much coal is being delivered to consumers in Georgia and other States east of here. At the mines where union men are out on strike the production could be much better. The union men are furnishing transportation back to their respective homes to many of the non-union men—in fact, it is stated that about as many men as are being brought into the district are being sent back again. A number of Hungarian miners from the north will be brought to the Birmingham district shortly.

State Mine Inspector J. M. Gray and his assistants are watching the coal production carefully, and regular visits are being made by the assistant inspectors to the various sections to see that the mining laws in regard to ventilation and other matters are carried out. The Tennessee Coal, Iron & Railroad Co. and the Sloss-Sheffield Steel & Iron Co. during the past week submitted bids for the hire of the convicts of Jefferson county, the largest county in the State. There are about 300 convicts per annum to be hired out. The county board of revenue is now considering the advisability of working the convicts on the county roads instead of working them in mines. The Tennessee company offers $1 per man per month more than the Sloss-Sheffield company. The latter company is now working the convicts in the Flat Top mines, in the western part of the county. The board of revenue is considering a proposition also of hiring the convicts under the same method as employed by the State—that is, to mine coal at so much per ton, the county feeding, clothing and watching the convicts. The State has realized more by hiring its convict labor out that way than by the old method.

Chicago. Dec. 19.

(From Our Special Correspondent.)

From the wholesale dealer's point of view, the last week has been another poor one. There can be no doubt that too much bituminous is being produced to meet the actual needs of the trade, and anthracite cannot be sold until it is actually needed by consumers. Even the presence of snow, with the thermometer below freezing most of the time, has not been sufficient to make the householder order his winter's supply, the buying of which has been postponed oftener than usual this winter. Retailers are affected by the attitude of their customers, with the result that congestion will be inevitable once the traffic begins to move. Already city dealers have found it difficult to supply their customers, with the snow impeding wagons. There has been a warning delay also in some railroad shipments. Country trade is reported better than city trade in anthracite.

The last cargoes by lake are in, and the custom house records show the arrival in 1904 of 1,074,853 tons of both anthracite and bituminous, against 1,250,615 tons in 1903. About 10 per cent of this is said to have been bituminous, against about 7 per cent in 1903. The deficiency in anthracite shipments was due chiefly to the strike on the lakes early in the summer.

Sales of western bituminous continue to lag, the only passable activity being in domestic sizes. Of Indiana and Illinois coals, domestic lump and egg bring $2@$2.40; steam lump brings $1.80@$2; run-of-mine, $1.60@$1.80, and screenings, $1.10@$1.30. Eastern bituminous is firm, smokeless being in especially good demand and selling at $3@$3.25. Hocking is not notably cut below the circular price of $3.25, and is in steady, strong demand. Other eastern coals are in fair demand.

Cleveland. Dec. 20.

(From Our Special Correspondent.)

The lake season of coal shipments is at an end for this year. The total movement was about the same as it was a year ago. The total will figure up somewhat over 9,000,000 tons. It was without very much change in rates all through. The steam coal conditions have not changed. The market is firm, but not aggressively strong. There has been good buying at the old prices. Pittsburg coal is bringing $1.05 at the mines, and Ohio coal $1.10 at the mines. There is not much change in the slack situation, except that prices are a little strong. Ohio slack is bringing 60c. at the mines for spot shipment, and 55c. at the mines on contract. Pittsburg slack is bringing 60c. at the mines for spot shipment, and 65c.@70c. at the mines for contracts. The ending of the lake season is shortening the supply, and is therefore telling on the prices which are being paid.

The coke trade is one of the strong features of the fuel situation. The demand for coke and the shortage of it has advanced the market rather rapidly, and since there is still a strong demand and a shortage which is more acute, the market has an upward tendency which is gratifying to the producers. The minimum prices now are $2.75 for 72-hour foundry coke, and $2.50 at the oven for furnace coke. The domestic trade is still active and the demand strong, with no change in the prices. These are governed by the association.

Pittsburg. Dec. 20.

(From Our Special Correspondent.)

Coal.—Coal mining operations in the Pittsburg district have been almost entirely suspended since last Wednesday. The trouble is over a shortage of railroad cars and a scarcity of water. An attempt was made yesterday to use mine-water in the boilers, but the results were very unsatisfactory. The large coal companies have individual cars, but this does not seem to be of much advantage, as in some instances the railroads have been unable to furnish locomotives to move them. Several coal operators declared to-day that a famine is likely to occur unless there is relief soon. The Pittsburg Coal Co. is preparing for an increased trade in the northwestern markets next season, and has just placed an order with the American Car & Foundry Co. for 2,000 steel coal cars, to be delivered early in the spring. It owns at present 4,000 cars, and if no trouble occurs on the lakes similar to the strike of the masters and pilots at the opening of the season this year, there is no doubt but that the shipment of Pittsburg coal to the northwestern markets will greatly exceed all former years. The demand continues good, and, except on urgent new business, prices remain about the same, on the basis of $1.05 a ton for run-of-mine coal.

Connellsville Coke.—Despite the drawbacks, the coke trade continues to increase steadily. Both production and shipments last week were in excess of the previous week. Prices continue very firm, and there are rumors of unusually high rates for the first half. Furnace coke is quoted this week at $2.25@$2.35 for prompt and first quarter shipment, and foundry coke remains at $2.50@$2.75. The water shortage is retarding production somewhat, but the car supply has been fairly good. The production for last week amounted to 223,456 tons, a gain over the previous week of 7,604 tons. The shipments aggregated 9,798 cars, distributed as follows: To Pittsburg and river points, 3,181 cars; to points west of Pittsburg, 5,502 cars; to points east of Everson, 1,115 cars. This was an increase of 627 cars.

San Francisco. Dec. 15.

(From Our Special Correspondent.)

Business continues quiet, with supplies about as usual. There is no change in prices.

For Pacific Coast coals, in large lots to dealers, quotations are: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky Mountain coals, also in large lots to dealers, prices named are $8.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside; Colorado anthracite brings $14. For Eastern coal, quotations are largely nominal, supplies being light. Pennsylvania anthracite is $14 and Cumberland $13. For English coal, quotations are, ex-ship: Welsh anthracite, $13; cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade. Dec. 21.

Imports of fuel into Germany for the ten months ending October 31 are reported as follows, in metric tons:

	1903.	1904.	Changes.
Coal	5,643,303	5,904,602	I. 261,299
Brown coal	6,661,119	6,201,934	D. 459,185
Coke	356,107	430,571	I. 74,464
Totals	12,660,529	12,537,107	D. 123,422

The chief imports of coal were from Great Britain; the brown coal, or lignite, was all from Austria.

Exports of fuel from Germany for the ten months ending October 31 are reported as follows, in metric tons:

	1903.	1904.	Changes.
Coal	14,348,265	14,641,994	I. 293,729
Brown coal	19,263	18,925	D. 338
Coke	2,106,790	2,259,926	I. 153,136
Totals	16,474,318	16,920,845	I. 446,527

The larger exports of coal were to Austria, Holland, Belgium and Switzerland; of coke to France and Belgium. There were 22,451 tons of coke reported sent to the United States this year.

The production of coal in Germany for the ten months ending October 31 is reported as follows, in metric tons:

	1903.	1904.	Change.
Coal	96,778,527	99,277,487	I. 2,498,960
Brown coal	37,404,630	39,670,010	I. 2,265,380
Total mined	134,183,157	138,947,497	I. 4,764,340
Coke made	9,707,799	10,166,354	I. 458,555
Briquettes made	8,612,962	9,411,952	I. 798,990

Of the coal reported this year, the mines of Prussia furnished 92,781,822 tons of coal and 33,616,753 tons of lignite, or brown coal.

Exports of fuel from Great Britain for the 11 months ending November 30 are given by the Board of Trade returns as below, in long tons:

	1903.	1904.	Changes.
Coal	41,261,705	42,461,143	I. 1,199,438
Coke	646,983	688,601	I. 41,618
Briquettes	882,859	1,143,023	I. 260,164
Totals	42,791,547	44,292,767	I. 1,501,220

In addition to these exports, there were 15,412,315 tons of coal sent abroad in 1903

for the use of steamers engaged in foreign trade, and 15,749,865 tons in 1904, an increase of 337,550 tons this year.

The exports to the United States, included above, were as follows:

	1903.	1904.	Changes.
Atlantic Coast ports. . .	1,061,956	30,108	D. 1,031,848
Pacific Coast ports	66,094	75,036	I. 8,942
Totals.	1,128,050	105,144	D. 1,022,906

Exports to Atlantic Coast ports in 1903 were nearly all in the early months of the year, when the deficit, caused here by the anthracite strike, was still felt.

IRON TRADE REVIEW.

NEW YORK, Dec. 21.

The iron market shows unexpected activity, considering that we are so close to the end of the year, which is always a dull time. Buying continues good in raw material, and there seems to be no slackening in the demand for pig iron. The United States Steel Corporation is putting in blast all its available furnaces, and the January statement will doubtless show a considerable increase in the weekly capacity of the active furnaces. Prices are very firm, and there are even reports of premiums having been paid for early deliveries. Steel billets are also in demand, and the association has advanced prices.

In finished material orders are coming forward quite actively. It is understood that considerable quantities of structural steel have been taken by the bridge-builders, and plates have also been rather largely taken by ship building and other interests. Advances of $2 per ton in plates and in steel bars have been ordered by the respective pools, to take effect January 1. The railroads are beginning to come forward, now that the price of rails has been definitely fixed; although the orders so far placed are hardly as large as had been expected. The Pennsylvania Railroad Co. has placed orders for 107,000 tons for 1905 delivery to be distributed among several mills.

Little is heard of export business, but it is understood that a good deal is being done quietly in that direction.

It is stated that the control of the Alabama Consolidated Coal & Iron Co. has passed to New York parties, through the sale of a large block of the common stock by Baltimore interests. Details of the transaction are not available as yet.

Iron Trade of Great Britain.—Exports of iron and steel, and manufactures thereof, from Great Britain, for the 11 months ending November 30, are valued by the Board of Trade returns as below:

	1903.	1904.	Changes.
Iron and steel	£28,158,887	£25,474,233	D. £2,684,654
Machinery. . .	18,215,586	19,139,360	I. 923,774
New ships . . .	4,036,268	4,052,498	I. 16,230
Total	£50,410,741	£48,666,091	I. £1,744,650

Exports of mining machinery, included above, were valued at £673,244 in 1903, and £806,087 in 1904; an increase of £132,843. Exports to South Africa were 39% of the total—£316,764—but showed an increase of only £1,932. Exports to Australia were £134,899 in 1904, an increase of £58,810 over last year.

The chief items of the iron and steel exports were as follows, in long tons:

	1903.	1904.	Changes.
Pig iron	1,011,192	752,761	D. 258,431
Steel ingots, blooms, etc .	143,251	112,843	D. 30,408
Bars and wrought-iron . . .	197,198	157,813	D. 39,385
Rails.	569,895	474,669	D. 95,226
Plates.	150,897	140,696	D. 10,201
Sheets	321,333	348,578	I. 27,245
Tin-plates	266,733	316,867	I. 50,134

The only items showing increases this year are sheets and tin-plates. Exports of tin-plates to the United States this year, were 64,294 tons, or 18,002 tons more than last year.

Imports of iron and steel into Great Britain for the 11 months were valued at £7,844,839 in 1903, and £7,586,830 in 1904; a decrease of £258,009. The chief items of these imports were, in long tons:

	1903.	1904.	Changes.
Pig iron	116,477	120,839	I. 4,362
Wrought iron	164,010	96,108	D. 67,902
Steel billets, blooms, etc . .	224,144	491,122	I. 266,978
All other kinds	667,962	487,882	D. 180,080

A notable item was the increase in billets, blooms, etc., chiefly from Belgium and Germany. Imports of iron ores were 5,800,308 tons in 1903, and 5,556,746 tons in 1904; a decrease of 243,562 tons. Of this ore Spain furnished 4,524,476 tons in 1903, and 4,206,741 tons in 1904; a decrease of 317,735 tons this year.

Birmingham. Dec. 19.

(From Our Special Correspondent.)

The Alabama furnace-men are looking for another advance in quotations for iron before the end of the year, though it would not be surprising if the demand should completely stop this week until the new year comes. It is reported that 1,500 tons of mill iron had been sold for delivery in the Pittsburg district on the basis of $13.75 per ton, No. 2 foundry. With the freight rate of $4.35 added, this would indicate that northern prices are not under the southern quotations. The aggregate business transacted already this month by the Alabama furnace-men is considerable, and deliveries will be made for six months to come. The greater portion of the iron to be manufactured with the furnaces now in operation during the first three months of the coming year has been provided for, while some sales have been made for delivery during the second quarter.

The production in Alabama shows no improvement over what it has been for the past four weeks. There will be no effort to start up more furnaces during the present year. There is not much surplus iron on the yards in this district. One or two of the iron companies are considering holding out for better prices. With a number of sales already made at $13.75 per ton for No. 2 foundry the indications are bright for a still better price, early delivery stipulated.

Several good orders were placed in this district during the past week. The railroads are preparing to handle a lively iron traffic after the holidays. The furnace companies are laying in great quantities of raw material for the holidays and because of the prospects of bad weather, which will hinder the operations at the ore and coal mines, coke ovens and dolomite quarries. The Alabama Car Service Association has informed the furnace companies that there will be no charges between December 16 and 31 for cars held over the allotted time, so that all companies can prepare themselves for the holiday period.

The following quotations are given for the product: No. 1 foundry, $14; No. 2 foundry, $13.50@$13.75; No. 3 foundry, $13; No. 4 foundry, $12.25@$12.50; gray forge, $12; No. 1 soft, $14; No. 2 soft, $13.50@$13.75.

Chicago. Dec. 20.

(From Our Special Correspondent.)

The week has been a quiet one for the iron trade, but it was satisfactory—so far as professions go, at least—to the leading agents for furnaces. It is to be expected that the last half of the closing month of the year should be quiet, and the most that can be done now is to prepare for the usual January business. Confidence in the market continues general; the doubters are few among buyers of iron, while the sellers assert that for six months at least there will not be a reaction. Certainly all the signs seem to point to a much better business in the first quarter of the coming year than the last quarter of 1904 has shown. Northern furnaces are well sold out for the next six months, and Southern orders have been so satisfactory as to make the furnace agents to all appearances not eager for business.

Southern iron brings $13.50@$14, Birmingham, or $17.15@$17.65, Chicago, and Northern, $17@$17.50. The lower figures represent the prices at which most business is being done, on shorter time contracts—not over six months—than the users of iron would like to make. Sentiment among selling agents is decidedly bullish as regards the future.

With the new year passed, there can be little doubt that there will be a rapid increase of business in both pig iron and finished products, and higher prices are very probable. The time between orders and deliveries doubtless will lengthen also, the tendency being now to make this time as short as possible, so that spot lots are in especially good demand, at premiums of about 50c.—in some cases of $1—for small quantities.

Coke is in a little better supply, and sells for about $5.15 for 72-hour Connellsville. The coke market will doubtless be quiet until after the first of the year, but there is every indication that it will be strong then.

Cleveland. Dec. 20.

(From Our Special Correspondent.)

Iron Ore.—The shipments for the season are at an end, and have aggregated about 21,000,000 tons. There is little talk now of sales, except for next year, and that is not definite.

Pig Iron.—The amount of foundry iron available for shipment is so small that the market is not interesting. A few sales to poor customers have been made at $17 for No. 2, Valley furnace, but the generality of sales of small lots for shipment through the first quarter are made at $16. There are a few sales of small lots of material for second quarter shipment at $16 in the Valleys, but they are limited by the amount which the buyers are willing to take at that price. The southern furnaces are offering No. 2 foundry at $13.50, Birmingham, but the southern iron takes a freight of $3.85 to Cleveland, and consequently the price is not attractive. There is a little buying of bessemer at $15.50@$16 in the Valleys. The basic producers are also selling small lots at $15.50, but the market is not broad. There is not much being done in the pig iron trade, as no big contracts have been closed.

Finished Material.—The market has been bullish, due to the reports which were generally spread that prices were to be advanced with the first of the year. The rush to get under cover has been the feature of the past week. Since a good deal of this buying has been speculative, the mills have not been catering to the trade, and have also been disposed to hold the customers off for a while. Increases in old contracts have been requested freely. The best feature of the market was structural, but since the nature of the trade was that which was referred to, the indications were not so favorable. The market all through was strong, with the mills so well filled that the question of delivery has to be raised. The plate trade was about the same as the structural. The market was stiff and the expectation of an advance in prices was general. There was good contracting and also good specifying against old contracts.

Bar iron prices have been advanced to 1.65c., Youngstown, and at that price the buying has been rather free. The changing off from bar iron to steel has been one of the features of the week. The bar iron prices share with the others the expectation of an advance, and this has been one of the strong influences in the market. There has been good buying of forging billets at $27.50@$28, and specification against rail contracts, although rail purchases have not been large. There has been a good market all through.

New York. Dec. 21.

Pig Iron.—The demand for pig iron keeps up, and quite a number of contracts are still on the market. The cast-iron pipe makers are understood to be looking for a good deal of material. Spot iron is scarce, and there are reports of premiums paid for short deliveries; but, as is usually the case, it is difficult to confirm these.

Prices are something like 25c. a ton higher all around. For Northern iron, large lots, New York harbor delivery, we quote as follows: No. 1X foundry, $17.50@$17.75; No. 2 X, $17@$17.25; No. 2 plain, $16.50@$16.75; gray forge, $15.50@$15.75. Virginia basic has been in some demand, and prices have been advanced to $17. The Southern furnaces are talking about a basis of $14, and even $14.50, Birmingham, for No. 2 foundry, and are not pressing sales. We quote for Southern iron on dock: No. 1 foundry, $17.50@$17.75; No. 2, $17@$17.25; No. 3, $16.50@$16.75; No. 4, $16@$16.25; No. 1 soft, $17.50@$17.75; No. 2 soft, $17@$17.25; gray forge, $15.25@$15.50 per ton.

On the Produce Exchange trading in iron warrants has been considerably more active. The latest quotations are as follows, the first

figure being the bid, and the second the asked price: December $17—$17.50; January, $17.10—$17.35; February and March, $17—$17.25; April, $16.90—$17.35; May and June, $16.90—$17.20. Actual sales have been made at $17.50 January, $17.10 March, and $17, May.

Bars.—The market is strong. Prices are 1.645c. for bar iron, carload lots, Jersey City delivery. Soft steel bars have been advanced $2 per ton and are quoted 1.645c., same delivery.

Plates.—Buying in small lots continues good and prices have advanced. We quote for tank plates, ¼ in., 1.645c., in large lots, tidewater delivery. Flange and boiler plates are 1.745c., and marine 1.845c., same delivery.

Scrap.—Old material continues strong, and demand is active. Most of the yards report light supplies. Machinery cast brings $13@$14 per ton, according to quality. No. 1 wrought, which is in demand, has sold up to $18 and $18.50, with very little to be had. Heavy steel melting scrap brings $15.50@$16. These prices are on cars, Jersey City, or other terminal deliveries. Material delivered brings about $1.50 more.

Steel Rails.—The regular quotation is $28 per ton at mill for large sections, with more business doing. Light rails continue in demand, and are higher, $22.50 being asked for 24-lb., and $23 up to $27 for lighter sections.

Structural Material.—Business continues to be principally in small lots. Quotations are higher, at 1.645@1.745c. for beams, angles and channels.

Philadelphia. Dec. 20.

(From Our Special Correspondent.)

Pig Iron.—The heavy buying of the past few weeks has taken quite a number of large consumers out of the market. In making the rounds of our larger consumers of this city we find that, with scarcely an exception, they have bought liberally, many of them for remote delivery. A few are still in the market trying to negotiate for considerable stocks, but the unwillingness of some makers, both north and south, to bind themselves up in a tight arrangement at current prices interferes with the immediate closing of some important negotiations. There is a disposition to buy all kinds of iron, and it is more than probable that by the close of the week definite arrangements will have been made by which some of our larger consumers will feel themselves perfectly safe. The larger users of basic iron have about all they need, but in foundry and forge there is still some business to be done. Forge iron is under active inquiry from a dozen quarters, and the requirements called for will most likely be covered very soon. Southern iron, according to our latest telegraphic advices, has been marked up under a pressure from the West. Our eastern Pennsylvania furnaces are all crowded with work, and quotations may be generally given at about $18 for No. 1X; $17.50 for No. 2; $16.50 for No. 2 plain; standard gray forge, $16 to $16.50; basic, $16; low phosphorus, $20.

Billets.—The official quotation for billets having been raised on Monday to the amount of $2 per ton, agents say to-day that they will close considerable business at once at $23 for open-hearth and bessemer. There is a good deal of material wanted, and a good deal of disappointment prevails among some buyers who are unable to conclude negotiations before the present advance.

Bars.—Bar iron has been selling at an average advance of $2 per ton for both iron and steel, and there is to-day quite an activity on the part of the smaller buyers to cover before a rumored advance takes place, which is said will be made in January.

Sheets.—The sheet mills are overcrowded with business, and some buyers who were expecting deliveries within 30 days find themselves compelled to take only a part of what they ordered in order that other urgent customers may be accommodated.

Pipes & Tubes.—Pipes and tubes for early delivery are bought at premium prices, but it is evident that the makers are not disposed to take advantage of the necessity of buyers, and are offering fair terms for future deliveries. There is a very active demand for boiler tubes.

Merchant Steel.—To-day's inquiries show that all kinds of merchant steel used in this territory are in quite active demand, and that users are endeavoring to accumulate stocks.

Plate.—Plates have been advanced on all orders taken within the past six days. All of this business was for early delivery. More business that has been presented calls for early spring delivery. It is impossible to ascertain what terms this business will be accepted on.

Steel Rails.—Orders for steel rails, it is believed, will now pour in. The Pennsylvania Railroad Co. has put in a large order, but much less than was expected.

Old Rails.—There is quite a move on the part of those concerns that use old rails, but the buyers do not like to pay $21, which is the asking price.

Pittsburg. Dec. 20.

(From Our Special Correspondent.)

There is no December lull in the iron and steel markets this year, and all the mills are busy, many being behind in deliveries. New business in some lines is being refused for the present by some interests. The independent sheet and tin-plate manufacturers cannot accept orders for future shipment, as they are not covered on steel. The leading interest started eight additional sheet mills yesterday, four at Wellsville and four at Struthers, O. But few of its mills are idle, and all will be running as soon as steel can be sent to them. Another advance in the price of tin-plate is expected shortly, and if the new rate is put at $3.60 a box, the wages of members of the Amalgamated Association of Iron, Steel & Tin Workers will be advanced 4 per cent, as the base of the tin-plate scale under this year's agreement is $3.40 a box. Wages advance 2 per cent for every advance of 10c. a box above the base. Sheets also are likely to be advanced. As has been predicted right along, the rail pool has continued the $28 rate for 1905, and so far the Pennsylvania Railroad has placed contracts for 102,700 tons, divided as follows: United States Steel Corporation, 55,500 tons; Cambria Steel Co., 20,100 tons; Pennsylvania Steel Co., 20,100 tons, and Lackawanna Steel Co., 7,000 tons. A representative of a rail-producing concern said to-day that the rail tonnage for the United States this year will not exceed 2,000,000 tons, and for the coming year he predicts that the railroads will not buy more than 2,500,000 tons. Predictions, however, have been made that the tonnage for next year will reach 3,000,000 tons.

The United States Steel Corporation is still in the market for pig iron, and is negotiating for a large tonnage for the first quarter. Furnaces are pretty well sold up, and those that will have iron for delivery after the first of the year are not anxious to sell, even at a price of $16, Valley furnace. Every effort is being made by the Carnegie Steel Co. to get the two new Dunora furnaces ready for operation during the first week in January. There are few blast furnace workmen in the vicinity of Donora, and men must be secured from other sections, which is causing delay. The urgent need of pig iron by the Carnegie Co. was shown by the ordering in of the two old blast furnaces at Columbus. Repairs to the one idle Lucy and one of the Isabella furnaces are being rushed, and both will be in blast soon, when the only idle furnace of the company will be the one at Zanesville. Edith furnace, of the American Steel & Wire Co., located in Allegheny, was blown in yesterday, after an idleness of six months. The wire interest may also blow in its Neville Island furnace. It was closed some time ago on account of complaints about the ore dust. Ella furnace, a Valley merchant plant, was blown in last week, and No. 2 of the Shenango Furnace Co., at Sharpsville, will be in operation again this week. Repairs are being made at No. 3 furnace, and it will not be ready for a start until some time next month. The United States Steel Corporation has purchased about 5,000 tons of heavy melting stock at $16.50 for delivery at Sharon, which is equivalent to about $17 delivered at Pittsburg. Heavy melting stock in the summer could be had at $12 and less. The corporation has a large output of its own, and only buys scrap in the open market in a case of emergency.

Pig Iron.—The pig iron market is quiet this week as to sales, but prices are much firmer. Bessemer is quoted at $16, Valley furnace; foundry No. 2 at $16.85@$17, Pittsburg, and gray forge at $16@$16.35, Pittsburg.

Steel.—There was some surprise that the meeting of billet manufacturers in New York on Monday did not advance prices, as it has been a fact that on the small business that has been done lately premiums have been freely paid, and with association prices reaffirmed, it is impossible to buy steel at them. Action is deferred until the next meeting, which may be held in January. A meeting of the structural pool was held on the same day that the billet association met, and an advance of $2 a short ton was made on the structural list, making prices as follows: Beams and channels, 15-in. and under, angles and zees, 1.50c.; tees, 1.55c.; beams and channels, over 15-in., 1.60c. At this writing the plate association is meeting; the telegraphic announcement of the result is that plates have been advanced $2 per ton. There is some change, however, in the schedule. The official quotations are now 1.40c., Pittsburg, and 1.545c., New York, for plates 14 in. and narrower; for plates over 14 in., the base price is 1.50c., Pittsburg. The bar association has also advanced prices of steel bars $2 per ton.

Sheets.—The market is very strong, and the quotation of the leading producer of 2.20c. for No. 28 gauge black sheets is largely nominal. It is known that premiums have been paid during the past week for prompt shipment. Galvanized sheets, No. 28 gauge, are quoted at 3.35c.

Ferro-Manganese.—Domestic 80 per cent is still quoted at $42@$43 a ton.

Cartagena, Spain. Dec. 4.

(Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—Shipments for the week were one cargo, 1,000 tons dry ore to Cette, and one cargo, 4,050 tons magnetic ore to Rotterdam. There is no change in the market.

Quotations for iron ores are as follows: Ordinary 50% ore, 6s.@6s. 3d.; special low phosphorus, 6s. 6d.@7s. 3d.; specular ore, 58% iron, 8s. 9d.; magnetic ore, 60%, 10s. 9d. for lumps and 9s. for smalls. For manganiferous ores quotations vary from 9s. 6d. for 12% manganese and 35% iron, up to 14s. 3d. for 20% manganese and 20% iron.

Pyrite.—Iron pyrite, 40% iron and 43% sulphur, is quoted at 10s. per ton. No shipments for the week.

CHEMICALS AND MINERALS.

New York, Dec. 21.

Stock-taking has begun, and from now until January will absorb most attention in the trade. Generally speaking, there has been a good cleaning up during the year, promising more stability in the price-schedule in future. A few more contracts for future delivery have been booked, and for heavy chemicals prices are firm. Raw materials are quiet, though foreign brimstone is easier, while nitrate of soda continues high.

Messrs. Emil Fog & Sons, of Messina, Sicily, write us under date of November 30 that in Iceland a railway is being built to the seaboard for the sulphur mines worked by Englishmen. It is reported that the Louisiana mines were offered $500,000 by the Anglo-Sicilian Co. to abstain from exporting to Europe, but this is denied officially. Dissidents, who are selling eagerly, have produced a decline of 2s.@3s. Unfortunately their arrivals will soon be exhausted, so that we shall have to fall back to the Anglo-Sicilian Co., which for several months has not been selling. The syndicate does not reduce its prices, except to buyers who will make contracts for a certain number of years; also to paper mills, which otherwise would burn pyrite. Some 3 or 4 years ago this concession would have been precious and probably have retained yearly from 30,000 to 40,000 tons now lost to the paper mills that have already altered their burners. We quote per ton, f. o. b., best unmixed seconds, bulk, 78s. 3d.; ground, in bags, 89s.; best thirds, bulk, 75s. 9d.; current thirds, 71s. 9d.;

refined block sulphur, 88s. 9d.@91s. 3d.; refined roll, 94s. 6d.@99s.; sticks, 103s.@105s. 6d.; sublimed flowers, pure, 107s.; current, 99s. 3d., and commercial, 93s. 9d.

Exports of brimstone from Sicily in October were 26,127 long tons, making a total of 409,974 for the 10 months this year. Compared with 1903 this shows a small decrease. The shipments to the United States for the 10 months were:

	1903.	1904.	Changes.
Best seconds	101,097	72,704	D. 28,393
Best thirds	27,410	16,824	D. 10,586
Total	128,507	89,528	D. 38,979

The decrease this year is equivalent to 30.3%, due principally to the expansion in the American production. It is noteworthy that the Sicilian receipts constituted nearly 80% of the total of 114,731 tons sulphur imported into the United States during the 10 months, indicating that 25,203 tons came from Japan and other countries.

Concerning the nitrate of soda market in Chile, Messrs. Jackson Bros., of Valparaiso, advise, under date of October 29, that with a strong demand prevailing during the fortnight, aided by speculation, prices have advanced from 7s. 10d. to 8s. for October-December deliveries, a price that has not been obtained for many years. Sales have also been effected at 7s. 9½d.@7s. 10½d. for January-March, and at 7s. 5d. for April-December, and a fair demand, at 7s. 6d., for April-June delivery. In the refined quality little has been done, 8s. being paid for this year's delivery, and 7s. 11½d. for January. The market closes firm with few sellers. We quote 95% November-December, 8s.; January, 7s. 11½d.; February-March, 7s. 11d., and 96%, November-December, 8s. 1d., all alongside. The price of 8s. alongside, with an all round freight of 20s., stands in 9s. 10¾d. per cwt, net, cost and freight, without purchasing commission. Sales reported for the fortnight were 1,098,000 qtl., and re-sales, 346,000 quintals.

Quotations for wholesale quantities are as below, f. o. b. New York, unless otherwise specified:

Brimstone,	Domestic 2ds, long ton	$21.45
	Domestic, 99.5%, long ton. (For Baltimore and Phila. add 25c.; Portland, 15c.)	21.75
	Foreign 2ds, long ton	21.00@21.50
	Foreign 3ds, long ton	20.50@21.00
Pyrite, Am. 42@44%, lump, unit, at shipping port		10@10½c.
	Am. fines, unit, at shipping port	8½@9c.
	Spanish, 46@52%, lump, unit	10@11½c.
	Spanish, fines, unit	9@10c.
Nitrate of soda, 95%, 100 lb.	spot	2.35
	shipments	2.325@2.35
96%, 100 lb.	spot	2.375
	shipments	2.35@2.375
Sulphate of ammonia, gas liquor, 100 lb.	spot	3.18
	shipments	3.20@3.225
Bleaching powder, prime, 100 lb		1.20@1.25
Cyanide, lb		19@20c.
Copper sulphate, 100 lb		5.125@5.25
Nitric acid, 36°, 100 lb.		5.00
38°, 100 lb.		5.25
40°, 100 lb.		5.50
42°, 100 lb.		5.75
Oxalic acid, com'l, 100 lb.		5.00@5.375
Sulphuric acid, 50°, bulk, ton		13.50@14.50
60°, 100 lb. in carboys		1.05
60°, bulk ton		18.00@20.00
66°, 100 lb. in carboys		1.20
66°, bulk ton		21.00@23.00
Phosphate, Fla. rock, 77@80%, f.o.b. shipping port		7.25@ 7.50
Fla. rock, 77@80%, c.if. Europe		10.67@11.85
Fla. land pebble, 68@73%, f.o.b. shipping port		3.75@ 4.00
Fla. land pebble, 68@73%, c.if., Europe		7.70@ 8.40
Tenn. 78@80%, f.o.b., Mt. Pleasant		4.00@ 4.25
Tenn., c.i.f. Europe		10.27@10.67
Tenn., 78%, f.o.b.		3.75@ 4.00
Tenn., 78%, f.o.b.		3.75@ 4.00
Tenn., 75%, f.o.b.		3.25@ 3.50
So. Car., land rock, f.o.b. Ashley River		3.25@ 3.50
So. Car., river rock, f.o.b.		3.00@ 3.25
So. Car., river rock, c.i.f. Europe		6.33@ 6.56
Algerian, 63@70%, c.i.f		7.04@ 7.71
Algerian, 58@63%, c.i.f		6.15@ 6.60
Algerian, 53@58%, c.i.f		5.05@ 5.20
Algerian, 58@63%, c.i.f		6.15@ 6.60
Tunis, c.i.f		6.15@ 6.60
Christmas isle, 80@85%, c.i.f.		13.20@14.03
Ocean isle, 88%, c.i.f.		13.60@14.45

Liverpool. Dec. 7.

(Special Report of Joseph P. Brunner & Co.)

Soda ash, for tierces, nearest range, is about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6 per ton net cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s.; bags, 5s. per ton under price for tierces. Soda crystals are in good jobbing demand at generally £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda, while not active, is moving off steadily at full values, as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton net cash. Special quotations for the Continent and a few other export quarters. Bleaching powder is in demand for home consumption, but quiet for export, at about £4 15s.@£5 per ton net cash, for hardwood, as to market.

METAL MARKET.

New York, Dec. 21.

Gold and Silver Exports and Imports.

At all United States Ports in November and year.

Metal.	November.		Year.	
	1903.	1904.	1903.	1904.
Gold:				
Exports.	$993,150	$28,813,443	$42,882,178	$107,709,000
Imports.	11,370,690	4,714,452	48,037,398	81,414,345
Excess	I.$10,377,540	I.$16,098,991	I.$5,155,220	E$26,294,655
Silver:				
Exports.	6,067,762	3,405,566	34,094,689	46,020,584
Imports.	2,556,426	2,452,395	21,895,853	23,692,105
Excess	E.$3,511,336	E. $953,171	E$12,198,836	E$22,328,479

Gold and Silver Exports and Imports, New York.

For the week ending December 17 and for years from January 1st.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$1,798,812	$608,887	$838,530	$8,038
1904	102,699,301	7,208,510	34,566,340	1,140,653
1903	31,866,867	18,974,227	31,654,026	3,267,818
1902	25,056,106	2,710,137	25,588,866	1,223,815

Gold exports this week were principally to Germany; imports mostly from France. Silver exports were largely to London; imports from Central America.

Exports of merchandise from the United States in November are reported by the Bureau of Statistics of the Department of Commerce and Labor at $157,679,570, a decrease of $4,910,353 from November. For the 11 months ending November 30 the statement is as follows:

	1903.	1904.
Exports	$1,309,933,517	$1,305,738,374
Imports	917,725,693	939,345,370
Excess, exports	$392,207,824	$366,393,004
Add excess of exports, silver		22,328,479
Add excess of exports, gold		26,294,655
Total export balance		$415,016,138

The gold and silver movement in detail will be found in the table at the head of this column.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending December 17 gives the following totals, comparisons being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts	$878,740,200	$1,060,057,700
Deposits	848,284,000	1,096,117,500
Circulation	46,036,100	42,780,500
Specie	157,887,000	211,142,600
Legal tenders	68,209,500	77,433,400
Total reserve	$226,096,500	$288,576,000
Legal requirements	212,071,000	274,029,375
Balance surplus	$14,025,500	$14,546,625

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars, and comparison is made with the holdings at the corresponding date last year:

	1903.		1904.	
	Gold.	Silver.	Gold.	Silver.
N. Y. Ass'n	$157,887,000	.....	$211,142,600	.....
England	152,139,570	.....	156,140,310	.....
France	476,337,840	$221,581,440	534,933,890	$221,208,440
Germany	165,205,000	58,045,000	185,185,000	65,065,000
Spain	72,660,000	95,320,000	74,390,000	99,845,000
Netherlands	20,918,500	32,417,000	28,086,000	30,758,000
Belgium	15,690,000	7,845,338	16,363,335	8,181,665
Italy	106,880,000	16,676,000	110,900,000	15,831,000
Russia	411,455,000	38,635,000	509,270,000	32,790,000
Austria	233,525,000	60,880,000	243,115,000	60,680,000

The returns of the Associated Banks of New York are of date December 17, and the others December 15, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Owing to efforts made to cover December contracts, silver has been firm, with an advancing tendency. The price, however, seems to have culminated at 28¼d. in London. The Russo-Chinese Bank is reported to have sold freely at top prices.

The United States Assay Office in New York reports receipts of 72,000 oz. of silver during the week.

Shipments of silver from London to the East for the year up to December 8 are reported by Messrs. Pixley & Abell's circular as follows:

	1903.	1904.	Changes.
India	£6,574,130	£9,167,768	I. £2,593,638
China	310,060	424,723	I. 114,663
Straits	771,879	79,268	D. 692,611
Totals	£7,656,069	£9,671,759	I. £2,015,690

Receipts for the week were £71,000 in bar silver from New York, and £9,000 from Australia; total, £80,000. Shipments were £227,500 in bar silver to Bombay, and £38,900 to Calcutta; also £58,000 in Mexican dollars to New York for Mexico; total, £324,400.

Indian exchange continues firm, although a smaller amount of Council bills has been offered. The average price at which they were taken was 16.05d. per rupee. Shipments of silver to India continue steady, and there is a general belief in London that more purchases for coinage will be made soon, especially as advices show considerable shipments of gold from India to England.

The movement of gold and silver in Great Britain for the 11 months ending November 30 is reported as follows:

Gold:	1903.	1904.	Changes.
Imports	£25,469,642	£30,053,554	I. £4,583,912
Exports	23,845,883	29,937,659	I. 6,091,776
Excess, imp'ts	£1,623,759	£115,895	D. £1,507,864
Silver:			
Imports	£8,954,969	£10,552,728	I. £1,597,759
Exports	9,927,017	12,070,567	I. 2,143,550
Excess, exp'ts	£972,048	£1,517,839	I. £545,791

Of the silver imports this year, £7,805,571, or 74% of the whole amount, came from the United States.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.48½	$0.49½
Peruvian soles and Chilean pesos	.43	.45
Victoria sovereigns	4.85½	4.87
Twenty francs	3.87	3.90
Spanish 25pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

December.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. Cathodes, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
15	14½@14¾	14½@14¾	14½@14¾	65½	29¼	4.60	5.82½	5.67½
16	14½@14¾	14½@14¾	14½@14¾	65½	29½	4.60	5.82½	5.67½
17	14½@14¾	14½@14¾	14½@14¾	....	29½	4.60	5.82½	5.67½
19	14½@14¾	14½@14¾	14½@14¾	66½	29¾	4.60	5.82½ @5.85	5.67½ @5.70
20	14½@14¾	14½@14¾	14½@14¾	65½	29½	4.60	5.82½ @5.85	5.67½ @5.70
21	14½@14¾	14½@14¾	14½@14¾	66	@29½	4.60	5.82½ @5.85	5.67½ @5.70

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire bars.

SILVER AND STERLING EXCHANGE.

December.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	December.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
15	4.8675	60⅜	27 1/16	19	4.8740	61¼	28¼
16	4.8690	60⅜	28⅛	20	4.87⅜	61	28⅜
17	4.87¼	60⅜	28⅛	21	4.87¼	61¼	28⅜

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver .925 fine.

Copper has ruled very quiet indeed throughout the week, and the usual holiday feeling prevails. Transactions have been few and far between, although there is still quite a good demand from the far East. The closing quotations are rather nominal at 14⅝@14⅞ for Lake copper; 14½@14⅝ for electrolytic in ingots, cakes and wirebars, 14¼@14⅜ for cathodes; 14⅛@14⅜ for casting copper.

The market for standard copper in London, which closed last week at £65 12s. 6d., opened on Monday at £66 2s. 6d., declined on Tuesday to £65 17s. 6d., and the closing quotations on Wednesday are cabled as £66@£66 1s. 3d. for spot, £66 7s. 6d.@£66 8s. 9d. for three months.

Statistics for the first half of December show an increase in the visible supplies of 100 tons.

Refined and manufactured sorts we quote: English tough, £68 10s.@£68 15s.; best selected, £69 10s.@£69 15s.; strong sheets, £80@£80 10s.; India sheets, £76@£76 10s.; yellow metal, 6½@6⅝d.

Exports of copper from New York and Baltimore for the week ending December 20, were 2,645 long tons. Imports were 150 tons copper, and $7,263 worth of ore, quantity not given.

Imports and exports of copper in Great Britain for the 11 months ending November 30 were as follows, in long tons; the totals giving the approximate quantity of fine copper contained in all material:

	1903.	1904.	Changes.
Copper ore	76,880	71,674	D. 5,206
Matte and precipitate	67,072	59,388	D. 7,684
Fine copper	57,553	82,502	I. 24,949
Total imports, fine copper	98,777	119,363	I. 20,586
Exports	49,577	45,876	D. 3,701
Balance, imports	49,200	73,487	I. 24,287

Of the imports this year, 188 tons of ore, 4,294 tons of matte and 44,736 tons of fine copper were from the United States, against 557 tons of ore, 4,110 tons of matte and 18,424 tons of fine copper last year.

Tin.—The corner which prevailed in the London market last week showed signs of failing on Monday; when there was a decline from £135 10s., the closing quotation of last week, to £134, and came to an entire stop on Tuesday, when there were transactions at £131. A reaction set in on Wednesday, and the closing quotations are cabled as £132 7s. 6d.@£132 10s. for spot, £130 7s. 6d.@£130 10s. for three months.

Our market here has ruled very quiet indeed, consumers confining their purchases to early deliveries. While 29½ was paid last week, the market declined to 29⅛ on Tuesday, and the closing quotations are given as 29⅛@29¼ for spot, 28¾@28⅞ for futures.

Imports of tin into Great Britain for the 11 months ending November 30, with re-exports of foreign tn, are reported as follows, in long tons:

	1903.	1904.	Changes.
Straits	25,050	28,710	I. 3,660
Australia	4,144	3,851	D. 293
Other countries	2,753	2,225	D. 528
Total imports	31,947	34,786	I. 2,839
Re-exports	22,050	25,121	I. 3,071
Net imports	9,897	9,665	D. 232

The re-exports are largely Straits tin in transit to the United States. A considerable part of the tin from other countries is Bolivian metal.

Lead is quiet but steady, and nothing of interest has transpired. The closing quotations are given as 4.60 New York, 4.52½ St. Louis.

The foreign market is somewhat easier, Spanish lead being quoted at £12 10s., English lead £12 12s. 6d. per ton.

Imports and exports of lead in Great Britain for the 11 months ending November 30 are reported as follows, in long tons:

	1903.	1904.	Changes.
United States	36,098	33,544	D. 2,554
Spain	97,915	101,540	I. 3,625
Australia	53,701	68,023	I. 14,322
Germany	12,267	15,205	I. 2,938
Other countries	7,941	7,518	D. 423
Total imports	207,922	225,830	I. 17,908
Exports	32,924	32,289	D. 635
Balance	174,998	193,541	I. 18,543

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of December 4, that the price of silver during the week has been 14.75 reales per oz. The price of lead has been 75.25 reales per quintal, which, on current exchange, is equal to £11 15s. 11d. per long ton, f. o. b. Cartagena. Shipments for the week were 65,991 kg. desilverized lead, 800,000 kg. argentiferous lead, and 1,213 kg. bar silver, all to Marseilles.

Spelter continues in very good demand, and there is a strong undertone. The closing quotations are given as 5.67½@5.70 St. Louis, 5.82½@5.85 New York.

The foreign market is easy, good ordinaries being quoted at £24 12s. 6d., specials at £24 17s. 6d. per ton.

Imports and exports of spelter in Great Britain for the 11 months ending November 30 are reported as follows, in long tons:

	1903.	1904.	Changes.
Spelter	77,048	80,247	I. 3,199
Zinc sheets, etc	20,815	20,607	D. 208
Total imports	97,863	100,854	I. 2,991
Exports	6,813	7,391	I. 578
Balance, imports	91,050	93,463	I. 2,413

Imports and exports of zinc ores are not reported separately.

Silesian Spelter Market.—Herr Paul Speier writes from Breslau, Germany, under date of December 1, that speculation has been active in spelter, and the price is advancing. Many of the works have sold at current prices their production up to March, 1905. For the current market, quotations are about 24.50 marks per 50 kg., f. o. b. cars at Breslau. This is equivalent to 5.29c. per lb. Exports of spelter have been on the increase, the total reported from Germany for the ten months ending October 31 being 52,121 metric tons, an increase of 4,603 tons over last year. Exports of sheets were 13,747 tons, an increase of 2,053 tons. Quotations for zinc sheets are 52.50 marks per 100 kg. Zinc dust is also higher, and for export a quotation is made of 43.75 marks per 100 kg., f. o. b. Stettin. This is equivalent to 4.77c. per pound.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of December 4, that the market continues strong and unchanged. Blende, 35% zinc, is quoted at 75 fr. per ton; calamine, 30% zinc, 54 fr. per ton. Exports for the week were 1,000 tons blende to Swansea, 3,000 tons blende and 500 tons calamine to Antwerp.

Antimony is dull and neglected. We quote Cookson's 8¼@8½; Hallett's 8@8¼; United States, French, Italian, Japanese, Hungarian and Chinese 8@8⅛c. per pound.

Nickel.—Producers quote 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots is higher, according to quantity, running up to 60c. for small orders.

Platinum.—Quotations are firm, at $19.50 per ounce.

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms, as follows: Heavy sheet and rod, 72c. per gram; foil and wire, 74c.; crucibles and dishes, 78c.; perforated ware, 85c., and cones, $1 per gram.

Quicksilver.—Prices are steady. In New York large lots can be had at $40 per flask, and $41@$41.50 for smaller orders. The San Francisco quotations are $42@$42.50 for domestic orders, and $41 for export. The London price is £7 15s. per flask, with the same figure quoted by second hands.

Imports of quicksilver into Great Britain, with re-exports of foreign metal, for the 11 months ending November 30, were as follows, in pounds:

	1903.	1904.	Changes.
Imports	2,616,078	2,475,206	D. 140,872
Re-exports	1,297,403	1,868,299	I. 570,896
Net imports	1,318,675	606,907	D. 711,768

The net imports—representing approximately the consumption—show a decrease of 54% this year.

Cadmium.—Herr Paul Speier writes from Breslau, Germany, under date of December 1, that metallic cadmium is in good demand. The metal guaranteed 99.5 per cent pure is selling in large quantities at 710 marks per 100 kg., packing included, f. o. b. Hamburg. This is equivalent to 76.6c. per lb. These prices are for net cash, in lots of not less than 100 kg. each.

Minor Metals and Alloys.—Thallium is quoted at 60@65 marks per kg. at Breslau, Germany. Manganese metal is quoted at 360 marks per 100 kg., f. o. b. Bremen, Germany. Manganese tin alloy, 55%, is quoted 365 marks per 100 kg. for first quality and 225 marks for second quality, both f. o. b. Bremen.

For other minor metals and their alloys, wholesale prices, f. o. b. works, are as follows:

	Per lb.		Per lb.
Aluminum.		Ferro-Chrom. (74%)	.12½c
No. 1 99% ingots	33@37c	Ferro-Tungsten (37%)	.45c.
No. 2. 99% ingots	31@34c	Magnesium, pure	
Rolled Sheets	4c. up	(N. Y.)	$1.60
Alum-bronze	20@23c.	Manganese, (98@99%	
Nickel-alum	33@39c.	N. Y.)	75c.
Bismuth	$2.10	Manganese Cu., (30@70%	
Chr'm'm, pure (N. Y.)	80c.	N. Y.)	40c.
Copper, red oxide	50c.	Molybdenum, (98@99%	
Fe.-Molybd'm (50%)	$1.00	N. Y.)	$2.75
Ferro-Titanium (20@25%		Phosphorus, foreign	45c.
N. Y.)	75c.	Phosphorus, American	70c.
Ferro-Vanadium, (25%		Solder, metal	50c.
N. Y.)	$1.10	Tungsten (best)	$1.25

Prices vary, chiefly according to size and terms of orders.

Missouri Ore Market. Dec. 17.

(From Our Special Correspondent.)

The highest price reported paid for zinc ore during the week was $50 per ton; no ore selling higher than this; but several bins were added to the $50 class. A number of bins of medium-grade ore were advanced by sharp competition 50c. and $1 per ton. It has become a pretty good index of a probable advance in the price of spelter whenever zinc ore advances, the metal following the ore upward, a fact that is a natural sequence of supply and demand. The first snow of the winter fell last night, and shut down all the handwork in the district, but warmer weather tonight indicates that mining can be resumed Monday. So far there has been very little freezing weather, the winter being open, dry and mild. As the output now barely meets the demand, with no reserve stock on hand, a serious cold wave would cause the smelters to run down their stocks at the works, and as none of them are carrying a very large supply a protracted spell of bad weather would prove a serious handicap. With this week's output the value is on the turning point of $11,000,000, the largest of any year in the district's history, in tonnage and value.

Following are the shipments of zinc and lead ores, their combined value, the district total for the week and for 51 weeks in tonnage and value, and the separate values for the district for zinc and lead, the week ending to-day:

	Zinc, lb.	Lead, lb.	Value.
Joplin	3,370,600	356,090	$88,250
Webb City-Carterville	3,313,130	562,890	89,480
Galena-Empire	1,146,250	71,160	27,350
Duenweg	624,090	84,330	17,190
Aurora	822,790	14,910	14,480
Alba-Neck	518,680	.....	12,700
Badger	481,180	.....	11,790
Carthage	247,480	.....	5,940
Prosperity	214,120	20,480	5,540
Granby	315,000	46,000	4,770
Oronogo	139,300	5,740	3,120
Sherwood	104,960	.....	2,540
Baxter	90,140	39,780	2,970
Zincite	55,130	24,180	1,930
Beef Branch	83,600	22,600	1,840
Central City	45,690	.....	890
Week's totals	11,572,220	1,248,160	$290,780
51 weeks' totals	514,798,960	65,984,930	$10,940,300
Zinc value, the week,	$253,740;	51 weeks,	$9,135,730
Lead value, the week,	37,040;	51 weeks,	1,804,570

Average Prices of Metals per lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan	28.33	28.845	4.075	4.347	4.865	4.863
Feb	29.43	28.087	4.075	4.375	5.043¾	4.916
Mar.	30.15	28.317	4.442	4.475	5.349	5.057
April	29.81	28.132	4.567	4.475	5.550	5.219
May	29.51	27.718	4.325	4.423	5.639	5.031
June	28.34	26.325	4.210	4.196	5.697	4.760
July	27.68	26.573	4.075	4.192	5.662	4.873
Aug.	28.29	27.012	4.075	4.111	5.725	4.866
Sept	26.77	27.780	4.243	4.200	5.686	5.046
Oct	25.92	28.596	4.375	4.200	5.510	5.181
Nov.	25.42	29.185	4.218	4.200	5.038	5.513
Dec	27.41	.....	4.162	.....	4.731	.....
Year	28.09	.....	4.237	.....	5.400	.....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.; February, 4.717c.; March, 4.841c.; April, 5.038c.; May, 4.853c.; June, 4.596c.; July, 4.723c.; August, 4.716c; September, 4.896c; October, 5.033c; November, 5.363c.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan	12.159	12.410	12.361	12.553	53.52	57.500
Feb	12.778	12.063	12.901	12.245	57.34	56.500
Mar.	14.416	12.299	14.572	12.551	63.85	57.321
April	14.454	12.923	14.642	13.120	61.72	58.247
May	14.435	12.758	14.618	13.000	61.73	57.321
June	13.942	12.269	14.212	12.399	57.30	56.398
July	13.094	12.380	13.341	12.505	56.64	57.256
Aug.	12.962	12.343	13.159	12.468	58.44	56.952
Sept	13.205	12.495	13.345	12.620	56.82	57.645
Oct	12.801	12.993	12.954	13.118	55.60	60.012
Nov.	12,617	14.284	12.813	14.456	56.30	65.085
Dec	11,952	.....	12.084	.....	56.36	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902.		1903.		1904.	
	London, Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.
Jan	25.62	55.56	21.98	47.57	26.423	57.055
Feb	25.41	55.09	22.11	47.89	26.665	57.592
Mar.	25.00	54.23	22.49	48.72	26.164	56.741
April	24.34	52.72	23.38	50.56	24.974	54.202
May	23.71	51.31	24.89	54.11	25.578	55.430
June	24.17	52.36	24.29	52.86	25.644	55.672
July	24.38	52.88	24.86	53.92	26.760	58.095
Aug.	24.23	52.52	25.63	55.36	26.591	57.806
Sept	23.88	51.52	26.75	58.00	26.349	57.120
Oct	23.40	50.57	27.89	60.36	26.760	57.923
Nov.	22.70	49.07	27.01	58.11	26.952	58.453
Dec	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53.57	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Company.	Payable.	Rate.	Amount.
†Am. Sm. & Ref., com.	Jan. 17	$1.25	$625,000
†Am. Sm. & Ref., pf.	Jan. 10	1.75	875,000
*Bartolome de Med.	Dec. 30	.70	1,395
Caribou Oil, Cal.	Dec. 15	.07	5,600
*Central Lead, Mo.	Dec. 28	.50	5,000
Elkton Con., Col.	Dec. 24	.01	25,000
‡Empire Steel & I., pf.	Jan. 2	1.50	44,500
†General Chem., pf.	Jan. 3	1.50	150,000
†Guggenheim Expl.	Jan. 10	1.75	183,750
*Homestake, S. D.	Dec. 24	.25	54,600
Intern'l Smok. Pow.	Jan. 3	.50	45,000
†Iron Silver, Col.	Jan. 1	.10	50,000
‡Maryland Coal, pf.	Dec. 31	2.50	47,125
Maryland Coal, pf., ex.	Dec. 31	2.50	47,125
*N.Y.& Hond. Ros.	Dec. 24	.10	15,000
North Star, Cal	Dec. 23	.35	87,500
*Pacific Coast Borax.	Dec. 29	1.00	19,000
Silver King, extra	Dec. 28	.66⅔	100,000
†Sloss-Sheff. S.& I., pf.	Jan. 3	1.75	117,250
Tenn. Copper	Jan. 25	1.25	218,750
†Va.-Car.Chem., pf.	Jan. 16	2.00	360,000

*Monthly. †Quarterly. ‡Semi-annual.

ASSESSMENTS.

Company.	Delinq.	Sale.	Amt.
Alpha Con., Nev.	Jan. 4	Jan. 20	$.05
Arctic, Cal.	Jan. 15	.....	.06
Beaver-Harrison, U.	Dec. 8	Dec. 31	.01
Challenge Con. Nev.	Dec. 19	Jan. 10	.10
Chollar, Nev.	Dec. 15	Jan. 5	.10
Con. Imperial, Nev.	Dec. 6	Jan. 4	.01
Copper Ranch, U.	Dec. 26	Jan. 16	.00½
Elsie, Utah	Jan. 2	Feb. 12	.04
Julia Con., Nev.	Dec. 8	Dec. 29	.03
Karma, Cal.	Jan. 2	.....	.10
Melcher, Ida.	Jan. 3	.....	.01
Mexican, Nev.	Jan. 10	Jan. 31	.15
Monster, Utah	Jan. 4	Jan. 25	.00½
Overman, Nev.	Jan. 5	Jan. 24	.10
Red Slide, Cal.	Jan. 13	.....	.05
Ridge & Valley, U.	Dec. 28	Jan. 14	.00½
Salt Lake Route, Ex	Dec. 27		1.00
Savage, Nev.	Jan. 6	Jan. 27	.10
Sharp, Utah	Jan. 15	Jan. 5	.00½
Silver-Copper, U.	Dec. 19	Jan. 9	.01
Spider, Ida.	Dec. 31	.....	.00½
Utah Con., Nev.	Jan. 12	Feb. 2	.10
Yellow Jacket, Nev.	Jan. 11	Feb. 16	.10

NEW YORK.

Company.	Par val.	Dec. 14 H.	Dec. 14 L.	Dec. 15 H.	Dec. 15 L.	Dec. 16 H.	Dec. 16 L.	Dec. 17 H.	Dec. 17 L.	Dec. 19 H.	Dec. 19 L.	Dec. 20 H.	Dec. 20 L.	Sales.
Acacia	1	.08	....	.09	08	....	....	....	....	....	....	....	....	1,500
Amalgamated	100	66½	63	.66	63½	68½	65½	69½	67½	68¾	66½	68	66¾	330,690
Anaconda	25	103	98	102½	100	103	....	106¼	104	....	....	....	....	4,700
Anaconda Gold	5	....	....	....	....	....	....	12	....	....	....	....	....	500
Best & Belcher	3	....	....	....	....	....	....	....	....	....	....	....	....	....
Breece	25	....	....	.05	....	....	....	....	....	....	....	....	....	300
Challenge	2½	....	....	....	....	....	....	20	....	....	....	....	....	200
Chollar	2½	.26	....	....	....	....	....	20	....	....	....	....	....	600
Chrysolite	50	....	....	.05	....	....	....	.05	....	....	....	....	....	600
Confidence	3	.80	....	....	....	....	....	....	....	....	....	.75	....	300
Con. Cal. & Va.	2½	1.95	....	1.80	....	....	....	....	....	1.70	1.65	1.55	....	1,100
Cripple Creek Con.	1	....	....	....	....	....	....	....	....	....	....	.11	....	500
Crown Point	1	....	....	.21	....	....	....	....	....	....	....	....	....	200
Elkton Con	1	....	....	....	....	....	....	.63	....	....	....	....	....	500
Federal Mg. & Sm.	100	....	....	60½	....	62	61½	67½	66½	....	....	67	60½	900
Preferred	100	76½	76	....	....	78	76	78	....	80	79	....	....	1,600
Gold Dollar	1	....	....	....	....	....	....	.07	....	....	....	....	....	1,000
Gresne Con. Cop.	10	27½	25½	27	25½	26½	25½	27⅜	26½	27	25⅜	26	25	85,600
Greene Con. Gold	10	8⅛	7⅞	8½	7½	8⅛	7½	8½	8	8½	7⅞	8½	7⅞	35,400
Hale & Norcross	3	....	....	.95	....	....	....	1.00	....	....	....	....	....	200
Homestake	100	....	....	....	....	....	....	....	....	.73	....	....	....	150
Isabella	1	.30	....	....	....	....	....	.29	....	....	....	....	....	700
Justice	2	....	....	.10	....	....	....	.10	....	....	....	....	....	600
Little Chief	50	....	....	....	....	....	....	....	....	....	....	.06	....	100
Mollie Gibson	5	....	....	....	....	....	....	.04	....	....	....	....	....	1,000
Moon Anchor	5	.08	.07	....	....	....	....	....	....	....	....	....	....	1,000
Moulton	25	.15	....	....	....	....	....	....	....	....	....	....	....	300
Ontario	100	....	....	3.75	....	....	....	....	....	....	....	3.75	....	500
Ophir	3	3.70	3.65	3.00	....	....	....	3.35	....	3.30	....	3.05	....	850
Overman	2	....	....	....	....	....	....	....	....	....	....	....	....	....
Pharmacist	1	.04	....	03½	....	....	....	.04	....	.04	....	....	....	4,500
Phœnix	1	.10½	....	.11	.10	....	....	....	....	....	....	....	....	1,900
Portland	1	....	....	1.75	....	....	....	1.70	....	1.75	....	....	....	300
Potosi	1	.16	....	....	....	....	....	....	....	.13	....	.12	....	800
Quicksilver	100	....	....	....	....	....	....	2.00	....	....	....	....	....	200
Quicksilver pf.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Savage	3	.28	....	.25	....	....	....	....	....	....	....	.19	....	800
Sierra Nevada	3	....	....	....	....	....	....	....	....	.43	42	....	....	700
Silver Hill	1	....	....	....	....	....	....	....	....	.65	....	....	....	300
Standard	10	....	....	....	....	....	....	....	....	....	....	....	....	....
Syndicate	1	.12	....	....	....	....	....	....	....	.15	....	....	....	300
Tennessee C.	25	37	36	36½	34½	35½	34½	37½	35½	38½	37½	38½	37	6,560
Union Copper	10	1½	1½	....	....	....	....	....	....	1	....	1½	....	600
United Copper	100	....	....	....	....	....	....	....	....	....	5	....	....	....
Preferred	100	....	....	....	....	....	....	56	....	57	5	58	....	456
Vindicator	1	....	....	.67	....	....	....	....	....	....	....	....	....	400
Work	1	.13	....	....	....	....	....	....	....	13	....	.12	....	3,000
Yellow Jacket	3	....	....	....	....	....	....	.15	....	....	....	....	....	200

Total sales, 492,606 shares.

SALT LAKE CITY.*

Dec. 17.

Company	Par Val	High.	Low.	Sales.	Company.	Par Val	High.	Low.	Sales.
Beck Tunnel Con.	....	.08½	.08½	1,500	May Day	$1	.24½	.19½	32,900
Butler-Liberal	$1	.12	.11½	2,600	Mammoth	20	1.62½	1.60	1,200
Carisa	1	.12½	.12½	1,900	N. Y. Bonanza	1	.28	.23½	26,400
Columbus Con.	1	1.26	1.26	500	Petro	1	.09½	.09½	900
Daly	20	2.67½	2.67½	400	Star Con.	1	.15	.14	8,200
Daly-Judge	1	5.50	5.25	1,400	Tetro	1	.19½	.18	10,000
Daly-West	20	12.00	12.50	380	Uncle Sam Con.	1	.24	.23	6,000
Grand Central	1	3.39½	3.15	437	Victor Con.	1	.03½	.03½	500
Joe Bowers	1	.02	.02	3,000	Victoria	1	2.35	2.15	2,050
Little Chief	1	.02½	.02½	7,000	Wabash	1	2.00	.85	6,900
Lower Mammoth	1	.13	.12½	14,500	Yankee Con	1	.39	.37½	2,600

*By our Special Correspondent. Total sales, 131,267 shares.

BOSTON, MASS.

Company.	Par val.	Dec. 14 H.	Dec. 14 L.	Dec. 15 H.	Dec. 15 L.	Dec. 16 H.	Dec. 16 L.	Dec. 17 H.	Dec. 17 L.	Dec. 19 H.	Dec. 19 L.	Dec. 20 H.	Dec. 20 L.	Sales.
Adventure Con	$25	....	....	....	....	....	....	5½	5½	....	....	6½	....	772
Allouez	25	18½	18	18	17½	18	....	18½	18	18	....	18½	17½	2,056
Amalgamated	100	67	62½	65½	63½	67½	65½	69	67	68½	66½	67½	66½	36,358
Am. Z. L. & Sm.	25	12½	11½	12½	12½	12½	12½	12½	12½	12½	12	12½	12	1,600
Anaconda	25	....	....	....	....	....	....	26½	....	....	....	....	....	100
Arcadian	25	....	....	....	....	1½	....	2	1½	1½	1½	1½	....	590
Arnold	25	1	....	....	....	....	....	....	....	....	....	....	....	100
Ash Bed	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Atlantic	25	16½	16½	16½	16	16	....	16½	....	16½	16	16½	16	945
Bingham Con.	50	34½	33	34	33½	34½	33½	35	34	35	34½	34½	....	5,530
Bonanza	10	.70	....	....	....	....	....	....	....	....	....	....	....	500
Boston Con.	5	6½	6½	6½	6½	6½	6½	....	....	6½	6½	6½	6½	2,295
Calumet & Hecla	25	652½	645	645	....	650	645	650	645	645	....	645	....	137
Catalpa	10	....	....	....	....	....	....	....	....	....	....	....	....	....
Centennial	25	26	24½	25	24½	25½	25	26	....	25½	24½	24½	24	2,755
Con. Mercur	5	....	....	....	....	....	....	38	....	38	36	40	38	360
Continental Zinc	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Copper Range	100	68½	66	67	65½	67½	66	68	66½	67½	65½	66½	64½	13,281
Crescent	10	....	....	....	....	....	....	....	....	....	....	....	....	....
Daly-West	20	....	....	13	12½	12½	....	....	....	13	12	12½	12	732
Elm River	12	....	....	....	....	....	....	....	....	....	....	....	....	....
Franklin	25	11	10½	11½	....	11	....	11½	11	11½	11	11	....	540
Granby Con.	10	5	4⅞	5	4⅞	5⅛	5	5⅛	5	5⅛	5⅛	5⅛	5	8,800
Greene Con.	10	28	25⅝	27	25⅛	27⅛	25⅝	27⅛	27	27⅛	25½	26⅛	25	51,368
Guanajuato Con.	5	3½	3¼	3¼	....	3½	....	3½	3¼	3½	3¼	....	....	1,015
Humboldt	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Isle Royal Con.	25	26	24½	25	....	26½	25½	26½	26	26	25½	26	25½	2,711
Mass Con.	25	9	....	9	8½	....	....	....	....	....	....	8½	....	445
Mayflower	25	1	....	1	....	1½	1	1	....	1½	1	1	....	2,200
Michigan	25	9½	9¼	9½	9¼	9½	9¼	9½	9	9½	....	9½	9	910
Mohawk	25	51½	51	51	49½	50	....	51	50½	50½	....	....	....	1,346
Mont. Coal & C.	25	5	4½	5	4½	5⅛	4½	5⅛	5	5½	5	5½	5	23,529
National	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Old Colony	25	....	....	....	....	....	....	....	....	1½	....	1½	....	215
Old Dominion	25	25⅞	24½	25	24½	26	24½	26	25½	....	....	25½	25	1,470
Osceola	25	93	95	92	....	93½	92	93½	93	92½	92	92	....	977
Parrot	10	27	26½	27	26½	26½	....	....	....	27	26	27	26½	999
Phœnix Con.	25	....	....	....	....	2⅜	....	....	....	2⅜	....	....	....	100
Quincy	25	105	....	103	102	103	....	....	....	....	....	105	....	115
Rhode Island	25	....	....	1⅛	....	....	....	....	....	1½	....	....	....	218
Santa Fe	10	2⅜	....	....	....	2⅜	2⅛	....	....	2½	2	2½	....	351
Shannon	10	9	8½	8½	8½	8½	8½	8½	8½	8½	8½	9½	8½	3,262
Tamarack	25	119	....	116	115	120	119	119	118	120	118	120	119	196
Tecumseh	25	3	....	....	....	....	....	....	....	2⅜	....	....	....	175
Tennessee	25	....	....	....	....	....	....	....	....	38½	37½	....	....	300
Trinity	25	11½	11	11½	10½	11½	10½	11½	10½	11	10½	11	8½	10,618
Union	100	....	....	....	....	....	....	....	....	....	....	4	....	200
United States	25	24½	24	24½	24½	25½	24½	25	24½	25	24½	24½	24½	9,733
U.S.Coal & Oil	25	11	10⅜	....	....	11⅜	11	11⅜	....	....	....	11½	11⅜	880
Utah Con	5	42⅞	42½	42⅜	42	43½	42	43½	42½	42⅜	41½	†42⅜	41	8,622
Victoria	25	4½	....	4½	....	4½	4½	4½	4½	4½	4½	4½	....	430
Winona	25	11½	....	....	....	12	11½	12½	12½	12	11½	11½	11½	2,225
Wolverine	25	105	104½	104½	....	104	....	....	....	105	....	....	....	115
Wyandot	25	1⅜	1½	1⅜	1½	2	....	2	1½	2	1½	....	....	810

Total sales, 202,336 shares. †Ex Dividend.

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	Dec. 14 H.	Dec. 14 L.	Dec. 15 H.	Dec. 15 L.	Dec. 16 H.	Dec. 16 L.	Dec. 17 H.	Dec. 17 L.	Dec. 19 H.	Dec. 19 L.	Dec. 20 H.	Dec. 20 L.	Sales.
Allis-Chalmers	$100	17½	....	16	....	16½	16	17	....	....	....	16½	....	1,100
Allis-Chalmers pf.	100	63	61	....	....	....	....	....	....	....	....	....	....	800
Am. Agri. Chem.	100	22	....	22	21	....	....	22	21	....	....	....	....	500
Preferred	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Sm. & Ref.	100	78¼	77½	78½	78	80½	78½	80½	80½	80½	79½	82	79½	39,600
Preferred	100	112½	112	....	....	113	112½	113½	113½	113½	....	113½	113½	3,500
†Cambria Iron	50	....	....	....	....	....	....	....	....	....	....	....	....	....
†Cambria Steel	50	25½	25	25½	25	25½	25½	25½	25½	25½	25½	25½	25½	3,420
Col. Fuel & Iron	100	45½	43	44½	42½	45½	43½	46½	46	46½	45	46½	46	51,825
Col. Fuel & Iron pf	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Col. & H. C. & I.	100	17	....	....	....	17½	17½	....	....	18	17½	....	....	600
General Chem.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
General Chem. pf.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
†Lehigh C. & N.	50	105	103½	110	106½	108	106½	107½	106	108	....	108½	106	7,452
*Mong. R. Coal	100	....	....	....	....	....	....	....	....	....	....	....	....	....
*Mong. R. Coal pf.	100	....	....	29½	29	....	....	29	28	29½	28½	28½	....	275
National Lead	100	22¾	....	22½	22½	23½	23	23½	....	23	....	23¼	23½	3,300
Preferred	100	....	....	....	....	....	....	....	....	98	....	97½	....	200
†Phila. Nat. Gas.	50	41½	41½	41½	41½	42	41½	41½	41½	41½	41½	41½	41½	3,161
Preferred	50	....	....	46½	....	....	....	47	46½	....	....	47	....	729
*Pittsburg Coal	100	23½	22½	22½	21	22½	21½	23½	....	23½	22½	23	22½	3,595
Preferred	100	81½	80½	81½	80	81½	80½	82½	81½	82	81½	82	....	3,212
Republic I. & S.	100	15½	14½	15½	14½	15½	15½	16½	15½	16½	16½	16½	....	7,425
Preferred	100	67½	66½	67½	66½	68	....	68½	68½	68½	68	68½	68½	3,900
Sloss-Shef. S. & I.	100	60	59½	....	....	60½	60	60½	....	61	60½	....	....	1,100
Preferred	100	102	....	....	....	....	....	103	....	....	....	....	....	200
Standard Oil	100	632	625½	635	630	635	633	638½	636	640	639	631	629	289
Tenn. C. I. & R.R.	100	69¾	67	68½	67½	71½	69	72½	71	....	....	72½	71½	35,700
U. S. Steel Corp	100	28½	26½	28	26½	29½	28	30½	29½	30	29½	29½	29½	436,615
Preferred	100	89½	87½	89½	87½	91½	89½	93	91½	93½	92	92½	92	480,068
Va.-Car. Chem.	100	40½	40½	40½	40	41½	40½	41½	41½	42	41	41½	41½	2,550
Preferred	100	....	....	....	....	....	....	....	....	113	....	114	113	1,000

*Pittsburg Exchange; †Philadelphia Exchange; all others, New York Stock Exchange.
Total sales, 1,092,116 shares.

STOCK QUOTATIONS.

SAN FRANCISCO.*

Company.	Location.	Dec. 8 H.	Dec. 8 L.	Dec. 9 H.	Dec. 9 L.	Dec. 10 H.	Dec. 10 L.	Dec. 12 H.	Dec. 12 L.	Dec. 13 H.	Dec. 13 L.	Dec. 14 H.	Dec. 14 L.	Sales.
MacNamara	Nev					.20				.24		.24		6,500
Mont. Tonopah	Nev					1.65	1.60			172½	167½	1.70	167½	4,180
Ton. Belmont	Nev					.75				.74	.71	.73	.72	2,100
Ton. Midway	Nev					.35	.34			.35	.34	.35		7,400
Tonopah	Nev													
Ton. North Star	Nev									.23	.22	.24	.22	3,800

*San Francisco & Tonopah Exchange. Total sales, 23,980 shares.

SAN FRANCISCO (By Telegraph).

Company.	December. 19	December. 20	Company.	December. 19	December. 20
Belcher	$0.17	$0.17	Gould & Curry	$0.18	$0.16
Best & Belcher	.95	.88	Hale & Norcross	.97	1.10
Caledonia	.41	.38	Mexican	1.05	1.00
Challenge Con.	.20	.17	Ophir	3.10	3.15
Cholar	.21	.21	Overman	.08	.06
Confidence	.70	.70	Sierra Nevada	.38	.38
Con. California & Virginia	1.40	1.40	Union Con	.44	.44
Crown Point	.13	.13	Yellow Jacket	.14	.13

COLORADO SPRINGS (By Telegraph).

Company.	Dec. 19 H.	Dec. 19 L.	Dec. 20 H.	Dec. 20 L.	Company.	Dec. 19 H.	Dec. 19 L.	Dec. 20 H.	Dec. 20 L.
Anaconda	.13⅞	.10½	.13⅞	.10½	Jack Pot	.05½			
C. K. & N	.23	.20			Last Dollar				
Cripple Ck. Con	.10	.09½	.10½	.10	Mollie Gibson	.04¾	.04¼	.05½	.04½
Doctor Jack Pot	.05⅝	.05⅛	.05⅛	.05½	Moon Anchor	.07	.06	.06¾	.05¾
Elkton Con	.69½	.68½	.68½	.68	Old Gold	.09	.08½	.08½	.08¾
El Paso	1.17	1.15½	1.16		Pharmacist	.04¾	.04½	.04½	.04½
Gold Dollar	.07	.06½	.07	.06½	Portland	1.90	1.75	2.00	1.76
Gold Sovereign	.08⅛	.08⅜	.08¼	.08⅜	Vindicator Con	.80		.80	
Isabella	.27	.26½	.27	.26½	Work	.13	.12½	.13	.12½

ST. LOUIS, MO.* Dec. 17.

Company.	Par Val.	Bid.	Ask.	Company.	Par Val.	Bid	Ask.
Am. Nettie, Colo	$10	$0.15	$0.20	Columbia Lead, Mo.	$10	$0.25	$1.90
Center Creek	10	1.40	2.00	Con. Coal, Ill	100	14.00	15.50
Central Coal & C.	100	61.00	62.00	Doe Run Lead, Mo.	100	110.00	115.00
Central C. & C., Pf	100	70.00	72.50	Granite Bimet., Mont.	10	.35	.38
Central Lead, Mo.	100	115.00	120.00	St. Joe Lead, Mo	10	14.00	16.60

*By our Special Correspondent.

DULUTH, MINN. Nov. 26.

Company.	Par Val.	Bid.	Ask.	Company.	Par Val.	Bid.	Ask.
Black Mountain	$1	$1.10	$1.25	Lake Sup. & Pitts	$10	$45.00	$46.00
Calumet & Arizona	10	105.00	110.00	Pitts. & Duluth	15	25.50	26.00
Calumet & Pittsburg	10	45.00	45.50	Shakespeare	1		.20
Houghton Develop	10	6.00	7.00	United Mexican	10		.25
Junction Development	15	74.00	75.00	Wolverine & Arizona	10		6.50

MONTREAL.* Dec. 17.

Company.	Par Val.	High	Low	Sales	Company.	Par Val.	High	Low	Sales
Dominion Coal	100	64.50	62.75	398	Montreal Steel	100	49.00		5
Dom. Coal, Pf	100	118.50	118.00	42	Mont'l Steel, Pf	100	99.00		10
Dom. I. & St	100	19.00	17.50	2,357	Nova Scotia St.	100	69.12½	67.50	580
Dom. I. & St., Pf.	100	60.00	57.00	876	N. S. Steel, Pf	100			

*Montreal Stock Exchange. Total sales, 4,278 shares.

MEXICO. Dec. 16.

Company.	Shares Issued	Prices, Mex. Bid.	Prices, Mex. Ask.	Company.	Shares Issued	Prices, Mex. Bid.	Prices, Mex. Ask.
DURANGO:				Soledad, aviada	$670	$1,140	$1,200
Ca. Min. de Penoles	2,500	$2,600	$3,000	Sorpresa, aviada	960	310	330
San Andres de la Sierra	200	10,000		MEXICO:			
GUANAJUATO:				Aldebarren	2,000	52	58
Cinco Senores y An. aviadoras	2,000	30	33	Buen Despacho	3,000	65	70
Cinco, Senores y An. aviada	400	30	33	Dos Estrellas	3,000	3,500	3,575
Providencia, San Juan de la Lus	6,000	133	140	La Esperanza (El Oro)	3,000	1,500	1,500
GUERRERO:				Santa Ana, Esperanza	2,400	15	30
Garduno y Anexas	7,200	30	35	NUEVO LEON:			
HIDALGO:				La Fraternal	1,000	580	620
Amistad y Con	9,600	69	71	Norias de Bajan	1,000	700	750
Carmen, aviada	1,100	220	240	SAN LUIS POTOSI:			
Guadalupe Fresnillo Mill	1,000	170	200	Concepcion y An	3,000	30	35
Guadalupe Fresnillo Mine	1,400	70	80	El Barreno, aviadora	2,000	98	102
Maravillas y An., aviador	1,680	90	110	Sta. Maria de la Paz	9,600	238	240
Maravillas el Lobo	1,000	130	180	ZACATECAS:			
Refugio, aviada	12,800	5	7	Asturiana y An	2,500	10	14
Sta. Gertrudis y An. aviadas	9,600	8	10	Candelaria y Pinos	2,500	40	50
Sta. Gertrudis y An. aviadora	28,800	70	72	San Carlos y Anexas	2,500	35	45
San Rafael y An., Trompillo	1,200	1,925	1,950	Sta. Maria de Gaud	2,500	85	95
San Rafael y An., aviada	1,200	750	780	MISCELLANEOUS:			
				Bartolome de Medina	2,000	95	100
				Naica (Chihuahua)	100	11,000	13,000
				Natividad (Oxaca) aviadora	1,800	870	885
				San Francisco Hac.	6,000	75	81
				Union Hacienda	3,000	360	375

LONDON. Dec. 9

Company.	Shares Issued.	Par value.	Latest dividend. Amt.	Latest dividend. Date.	Quotations. Buyers.	Quotations. Sellers.
American:		£ s. d.	s. d.		£ s. d.	£ s. d.
Alaska-Treadwell	200,000	5 0 0	4 0	Oct., 1904	4 15 0	5 0 0
Anaconda	1,200,000	5 0 0	2 0	Nov., 1904	5 0 0	5 2 6
Camp Bird	820,000	1 0 0	9	Nov., 1904	1 8 3	1 8 9
Copiapo	112,500	2 0 0	5 0	Oct., 1904	1 0 0	1 5 0
De Lamar	80,000	1 0 0	2 0	Nov., 1904	15 0	1 0 0
El Oro	1,080,000	1 0 0	9	July, 1904	1 1 9	1 2 11
Frontino & Bolivia	140,000	1 0 0	rts.	Mar., 1904	9 6	10 6
Le Roi	200,000	5 0 0	5 0	Nov., 1899	15 0	17 6
Le Roi No. 2	120,000	5 0 0	1 0	June, 1904	18 9	1 1 3
Mesquital	250,000	1 0 0	3	Feb., 1903	2 6	3 0
*Palmarejo & Mexican	445,000	1 0 0	3	Nov., 1904	8 9	9 3
Standard	500,000	4 0	1½	Sept., 1903	1 0	2 0
Stratton's Independence	1,000,007	1 0 0	6	Dec., 1904	5 6	6 0
St. John del Rey	546,265	1 0 0	6	Dec., 1904	13 6	14 6
Tomboy	300,000	1 0 0	1 0	June, 1902	1 5 0	1 7 6
Ymir	200,000	1 0 0	1 0	Mar., 1902	3 9	6 3
European:						
Linares	15,000	3 0 0	5 0	Sept., 1904	4 0 0	4 10 0
Mason & Barry	185,172	1 0 0	7 0	May, 1904	3 2 6	3 7 6
Rio Tinto	325,000	5 0 0	32 6	Nov., 1904	59 17 6	60 2 6
Rio Tinto, preferred	325,000	5 0 0	2 6	Nov., 1904	6 2 6	6 7 6
Tharsis	625,000	2 0 0	7 0	May, 1904	5 0 0	5 5 0
West Australian:						
Associated	495,388	1 0 0	2 6	July, 1904	1 16 3	1 18 9
Cosmopolitan	400,000	1 0 0	1 0	Apr., 1904	6 0	6 6
*Golden Horseshoe	300,000	5 0 0	6 0	Nov., 1904	6 18 9	7 1 3
Great Boulder	1,750,000	2 0	9	Dec., 1904	1 2 0	1 2 6
Gt. Boulder Persever ce	1,400,007	1 0 0	1 0	Sept., 1904	10 6	11 0
Great Fingall	250,000	1 0 0	7 0	Oct., 1904	8 0 0	8 2 6
Ivanhoe	200,000	5 0 0	5 0	Oct., 1904	7 17 6	8 0 0
Kalgurli	120,000	1 0 0	2 6	Jan., 1905	6 3 9	6 6 3
Lake View	250,000	1 0 0	1 6	Oct., 1904	1 2 6	1 5 0
Oroya-Brownhill	450,000	1 0 0	4 0	Dec., 1904	3 10 0	3 12 6
Miscellaneous:						
Brilliant Central	100,000	1 0 0	1 0	Nov., 1904	1 2 6	1 7 6
Briseis	600,000	1 0 0			10 0	11 0
Broken Hill	960,000	8 0	1 0	Nov., 1904	2 2 0	2 3 0
Mt. Lyell	1,200,000	3 0 0	1 3	Dec., 1904	16 0	17 0
Mt. Morgan	1,000,000	1 0 0	3	Dec., 1904	2 16 3	2 18 9
Waihi	497,412	1 0 0	2 6	Dec., 1904	6 0 0	6 2 6
Indian:						
Champion Reef	2,000,000	10 0	1 5	Jan., 1905	1 13 6	1 14 6
Mysore	580,000	10 0	4 6	Nov., 1904	6 8 9	6 11 3
Nundydroog	484,000	10 0	1 6	Nov., 1904	1 12 6	1 13 9
Ooregum	683,000	10 0	9	Dec., 1904	19 0	20 0
Ooregum, pfd	240,000	10 0	9	Dec., 1904	1 7 7	1 8 9
South African:						
Angelo	600,000	1 0 0	7 0	Aug., 1904	7 0 0	7 2 6
Bonanza	200,000	1 0 0	8 0	Aug., 1904	1 3 9	1 6 3
British South Africa	4,568,392	1 0 0	rts.	May, 1899	2 2 6	2 3 9
Cape Copper	300,000	2 0 0	6	Jan., 1905	4 13 9	4 16 3
Cape Copper, pfd	45,000	2 0 0	6	Jan., 1905	4 2 6	4 7 6
City & Suburban	340,000	4 0 0	4 0	Aug., 1904	6 0 0	6 2 6
Consol. Gold-Fields	2,000,000	1 0 0	2 6	Dec., 1904	7 15 0	7 17 6
Crown Reef	120,000	1 0 0	18 0	Nov., 1904	15 5 0	15 15 0
De Beers, preferred	800,000	2 10 0	10 0	Aug., 1904	18 2 6	18 5 0
De Beers, deferred	1,000,000	2 10 0	12 6	Aug., 1904	18 6 3	18 8 9
East Rand	990,000	1 0 0	5 0	July, 1903	8 13 9	8 16 0
Ferreira	95,000	1 0 0	22 6	Aug., 1904	23 0 0	23 10 0
Geldenhuis	200,000	1 0 0	5 0	Aug., 1904	5 12 6	5 17 6
Geduld	400,000	1 0 0	rts.	Mar., 1902	7 6 3	7 7 6
Henry Nourse	125,000	1 0 0	8 0	Aug., 1904	8 2 6	8 7 6
Jubilee	50,000	1 0 0	5 0	Aug., 1904	3 5 0	3 15 0
Jumpers	100,000	1 0 0	2 6	May, 1904	2 7 6	2 12 6
Langlaagte	470,000	1 0 0	2 0	Aug., 1904	3 17 6	4 0 0
May	288,750	1 0 0	3 0	Aug., 1904	4 0 0	4 2 6
Meyer & Charlton	100,000	1 0 0	5 0	Aug., 1904	5 7 6	5 12 6
Modderfontein	290,000	1 0 0	rts.	Apr., 1902	10 8 9	10 11 3
Namaqua	94,331	2 0 0	3 0	Dec., 1904	3 15 0	3 17 6
New Jagersfontein	200,000	5 0 0	15 0	Dec., 1904	29 5 0	29 15 0
New Primrose	325,000	1 0 0	3 0	Aug., 1904	3 6 3	3 8 9
Rand	1,795,956	5 0 0	5 0	Aug., 1904	11 5 0	11 7 6
Robinson	550,000	5 0 0	6 0	Aug., 1904	10 0 0	10 5 0
Robinson Deep	950,000	1 0 0	3 0	Aug., 1904	5 15 0	5 17 6
Rose Deep	425,000	1 0 0	3 0	Aug., 1904	8 15 0	9 0 0
Salisbury	100,000	1 0 0	2 0	Jan., 1905	2 0 0	2 5 0
Village Main Reef	400,000	1 0 0	4 0	July, 1904	7 0 0	7 5 0
Wemmer	80,000	1 0 0	12 6	Dec., 1904	10 10 0	11 0 0

*Ex-dividend.

LONDON (By Cable).*

Company.	Dec. 14 £	Dec. 14 s.	Dec. 14 d.	Dec. 21 £	Dec. 21 s.	Dec. 21 d.	Company.	Dec. 14 £	Dec. 14 s.	Dec. 14 d.	Dec. 21 £	Dec. 21 s.	Dec. 21 d.
Camp Bird	1	8	6	1	8	3	Esperanza	1	0	0	1	1	3
Con. Gold Fields	7	18	9	8	5	0	Modderfontein	10	11	3	10	13	9
DeBeers	18	2	6	18	0	0	Rand	11	8	9	11	11	3
Dolores	1	7	9	1	8	9	Rio Tinto	60	3	9	60	10	0
East Rand	8	19	4½	9	1	3	Simmer & Jack	2	8	1½	2	7	6
El Oro	1	2	6	1	2	6	Tomboy	1	7	6	1	8	9

*Furnished by Wm. P. Bonbright & Co., 24 Broad St., New York.

PARIS.

Company.	Location.	Capital Stock.	Par value.	Latest dividend.	Prices. Opening.	Prices. Closing
		Francs.	Fr.	Fr.	Fr.	Fr.
Anzin, Coal	France			290.00	5,725.00	5,710.00
Boleo, c	Lower Cal.	12,000,000	500	104.17	2,245.00	2,260.00
Champ d'Or, g	S. Africa	3,375,000	25	3.75	16.75	16.75
Courrieres, Coal	France	600,000	500	110.00	2,910.00	2,949.00
Fraser River, g	Brit. Col	250,000	25		5.50	5.50
Huanchaca, s	Bolivia	40,000,000	125	2.50	92.75	93.75
Laurium, z, l	Greece.	16,300,000	500	25.00	309.00	309.00
Malfidano, z	Italy	12,500,000	500	50.00	625.00	630.00
Metaux, Cie. Fran. de	France	25,000,000	500	22.50	510.00	505.00
Mokta-el-Hadid, i, l	Algeria	18,312,000	500	40.00	1,022.00	1,010.00
Nickel, n	N. Caledonia	15,000,000	250	22.50	639.00	610.00
Penarroya, Coal	Spain.		500	45.00	1,130.00	1,136.50
Vielle Montagne, z	Belgium	9,000,000	30	30.00	778.00	778.00

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. s—Silver. z—Zinc.